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Aims and scopes

Sudan Medical Journal is published by Sudan Medical Association, the official academic branch of Sudan Doctors Union. This is a peer-reviewed journal published 4 - monthly. Its main objective is to reflect local scientific research in various aspects of medicine as well as regional and international relevant research. Basic scientific research clinical practice, experiences that help in patient management are also welcome. Review articles, original articles, case reports are welcome. Local research in medical education and history of medicine in the Sudan will be considered for publication.

Manuscripts must be solely submitted to this journal. All authors must sign approving the submitted version. Any conflict of interest must be stated clearly. Ethical clearance must be presented in relevant submission.

Manuscript submission: only electronic version sent to this e mail addressed to the Editor-in-Chief will be considered Sudanmedicaljournal@gmail.com.

Instructions for authors

Manuscript

All parts of the manuscript should be prepared in a double-spaced typewritten on size A4 paper. A covering letter signed by all authors must be forwarded. The format contains

Title page

With full names of all authors and the highest degrees and affiliations. The corresponding author both e mail address and fax number should be provided.

Keywords

3 - 6 keywords should be provided.

Abstract

Original articles must have an abstract of not more than 300 words and structured with subheadings as follows: objectives, methods, results and conclusion. Arabic summary will be needed from the next issue.

Review articles are submitted with special arrangement with the Chief Editor. Case reports are welcome and should not have more than 10 references.

Introduction

It should give a short concise overview of the current state of affairs with background information. It will explain the justification do to this work and points to the gaps that needs to be addressed. This will state the main objectives of this work.

Patient & Methods

A clear description of the methodology used as well as the subjects selection. Inclusion and exclusion criteria should be mentioned.

Results

Can be presented in form of text, tables and figures. Avoid repetition of data in the three format. Tables and figures should be accompanied with a clear descriptive legends.

Discussion

This part should focus in discussing the results obtained. Avoid repetition of the results. This part ends with a conclusion summarizing the final outcome of the study.

References

Vancouver style (References quotation number within brackets). Up to 6 authors should be all provided. If more than 6 authors, then write the first three authors and et al.

e.g. Journals

Ahmed BG, Ali HJ, Hassan CG. Malaria in Khartoum. Sudan Med J 2008;23:23-7.

Books

Hamid GH, Hasan MG. Mycetoma. Khartoum: University Press;2008.p.23-34.


Chapter in a book

Osman MD, Mohamed RF, Clinical representation of malaria. In: Malaria in the Sudan. Khartoum: University Press; 2001.p.25-45.




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The current status of maternal HIV infection in Sudan: time for action?

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الوضع الحالي للعدوى بفيروس نقص المناعة البشرية للأمهات في السودان : هل حان وقت العمل؟

زاهر عثمان الطاهر بابكر ، عبدالله على محمد ، البشرى على محمد حريكة

الملخص

هذا المقال يقيم الوضع الحالي لفيروس نقص المناعة البشرية (الإيدز) في أوساط النساء الحوامل في السودان. ويناقش أيضا المستويات الحالية للوصول والاستفادة من الخدمات القائمة للأمهات وكذلك استراتيجيات منع انتقال عدوى فيروس نقص المناعة البشرية من الأم إلى الطفل. السودان لديه وباء على مستوى منخفض من الإصابة بفيروس نقص المناعة البشرية وسط الامهات يقدر بأقل من ١٪ في الوقت الحاضر ولكن هذا الوضع قد يتغير في المستقبل. على الرغم من الفوارق القائمة بين المناطق الحضرية والريفية في مستوى الاستفادة من خدمات ما قبل الولادة ، نجد ان أكثر من ثلثي النساء الحوامل تلقين رعاية ما قبل الولادة من قبل أي من العاملين الصحيين المهرة على الأقل مرة واحدة خلال فترة الحمل ، ونصفهن تقريبا تم الحصول على عينة من الدم منهن خلال زيارة ما قبل الولادة. ولكن بالمقابل نجد ان الوصول إلى اختبار فيروس نقص المناعة البشرية قبل الولادة كان اقل من ١٪ وكذلك اقتصر الحصول على العلاج المضاد للفيروسات إلى أقل من ١٠٪ في الوقت الحالي. تعزى تلك النتائج إلى الطبيعة الرأسية للبرنامج الحالي للوقاية من انتقال الفيروس من الأم إلى الطفل والذي يسير بشكل مواز لنظام الرعاية الصحية القائم في السودان. من المرجح أن تتحسن التغطية لهذه الخدمة الأساسية باعتماد الاختبار الروتيني لفيروس نقص المناعة البشرية قبل الولادة إلى جانب اتباع نهج متكامل للوقاية من انتقال فيروس نقص المناعة البشرية من الأم إلى الطفل.

Abstract

This review article assesses the current situation of the human immunodeficiency virus (HIV) infection among pregnant women in Sudan. Moreover, current levels of access and utilisation of existing maternal services as well as strategies to prevent mother-to-child transmission of HIV infection are also discussed. At present, Sudan has a low-level epidemic of HIV infection with a maternal prevalence level of <1% but the situation may change in future. Despite the existing

disparities in the level of use of antenatal services between urban and rural areas in Sudan, more than two thirds of pregnant women received antenatal care by any skilled personnel, at least once during their pregnancy and nearly half of them had a blood sample obtained during their antenatal visits. However, access to antenatal HIV testing and antiretroviral therapy during pregnancy has been severely restricted to <1% and <10%, respectively. The poor performance of the current programme for prevention of mother-to-child transmission (PMTCT) in Sudan could be attributed to its vertical nature that makes it run parallel to the existing healthcare system. Routine antenatal HIV testing on an opt-out basis coupled with an integrated approach to PMTCT is likely to improve coverage of this essential service.

Keywords: HIV, pregnancy, Sudan

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Introduction

The current pandemic of the human immunodeficiency virus (HIV) presents unprecedented challenges to the health of women and children living in resource-constrained settings in which antiretroviral therapy, elective caesarean sections, and safe alternatives to breastfeeding are not readily accessible⁽¹⁾. With over 13-million women infected with HIV in sub-Saharan Africa and nearly 400,000 HIV-infected infants born each year⁽²⁾, urgent concerted action is needed to effectively deliver evidence-based interventions aimed at preventing mother-to-child transmission.

In this article, we will assess the current situation of the HIV epidemic in Sudan with particular emphasis on pregnant women, review the quality of existing maternal services, and discuss current strategies to prevent mother-to-child transmission of HIV infection in Sudan.

Current burden of maternal HIV infection in Sudan

In epidemiological terms, the spread of HIV infection is usually described as low-level, concentrated, or generalized and these patterns are characterised by HIV prevalence rates not consistently exceeding 5% in any defined sub-population, consistently >5% in at least one defined sub-population but <1% in pregnant women in urban areas, or consistently >1% in pregnant women, respectively⁽³⁾.

The current HIV epidemic in Sudan is fuelled by heterosexual transmission⁽⁴⁾. Recent estimates of HIV infection indicate a prevalence of 1.4% in adults aged 15-49 years and that 59% of all new infections have occurred in women aged 15-49 years⁽⁴⁾. Furthermore, high-risk groups such as commercial sex workers in Khartoum state were reported to have low prevalence levels of 0.9%⁽⁵⁾. However, there is paucity of accurate data on the current burden of maternal HIV infection in Sudan as <1% of antenatal care

(ANC) clinics performed routine HIV testing⁽⁴⁾.

Recently published studies from central and eastern Sudan reported HIV prevalence rates of 0.98% and 0.23%, respectively, among pregnant women^(6,7). Of note, the former study used direct interviews as a means to seek informed consent for HIV testing but suffered a high refusal rate of nearly 60%. By contrast, the latter study adopted an anonymous unlinked testing strategy to adjust for participation bias. Moreover, the 95% confidence intervals of both studies overlapped indicating no significant difference in their reported prevalence estimates. An earlier study from central Sudan reported high prevalence of sexually transmitted infections among ANC attendees but none was due to HIV⁽⁸⁾. Another study from eastern Sudan found no cases of HIV and visceral leishmaniasis co-infection in a small cohort of pregnant women⁽⁹⁾.

Prevalence estimates provided by the existing prevention of mother-to-child transmission (PMTCT) services in Sudan are unreliable due to low levels of HIV testing uptake. For example, Kassala state records indicate that PMTCT services only managed to test 27% of pregnant women who were offered HIV testing during 2009⁽¹⁰⁾.

Overall, 70.4% of Sudanese women aged 15-49 years have heard about AIDS (Acquired Immunodeficiency Syndrome) but only 4% were aware of the major methods for preventing HIV transmission (having only one faithful uninfected sex partner; always using a condom when having sex with anyone else; and abstaining from sex before finding a long-term partner)⁽¹¹⁾. Furthermore, knowledge on major routes of HIV transmission such as unprotected sexual intercourse, unscreened blood transfusions and sharing of contaminated needles was satisfactory in 52%, 40%, and 39%, respectively. However, the proportion of women who were aware of all

three routes of mother-to-child transmission (during pregnancy, during labour, and through breast feeding) was only 26%⁽¹¹⁾.

There are gender-specific differences in heterosexual transmission of HIV as male to female transmission is generally two to three times higher than that of female to male⁽¹²⁻¹⁵⁾. The fact that the female genital tract anatomy allows post-coital retention of semen in much greater volume than that of vaginal fluid on the penis and that women are more likely to experience asymptomatic sexually transmitted infections that facilitate virus entry, provide biological explanations for women's vulnerability to HIV infection. Moreover, young age at first sexual intercourse has been shown to be an independent risk factor for acquiring HIV infection in women in settings where the mode of spread is predominantly heterosexual⁽¹⁶⁾. This is supported by the fact that younger women tend to have larger areas of cervical ectopy and are more likely to experience traumatic coitus⁽¹⁷⁻¹⁹⁾.

As pre-marital sex is frowned upon in most parts of Sudan and unlikely to be admitted, it might not be unreasonable to use women's age at the time of marriage as a surrogate for their first coital debut. In Sudan, 36% of women get married under the age of 18 years and, worryingly, 12.4% of them get married before their 15th birthday⁽¹¹⁾. Polygamy is rife in the Sudanese society and, alarmingly, this has been associated with low levels of male condom use⁽¹¹⁾. Nevertheless, the overall HIV prevalence in adults has remained low. The widespread practice of male circumcision, which has been shown to reduce HIV transmission by up to 60 % ^(20,21), seems the likeliest explanation for this paradox.

Socio-cultural traditions in Sudan give women a status that is generally inferior to their male counterparts. Of interest, there is evidence from rural Uganda suggesting that women tend to seek their partners' approval before agreeing to undergo HIV testing⁽²²⁾.

Furthermore, Sudanese women diagnosed with HIV infection suffer extreme social stigmatisation. This often takes various forms of social exclusion such as eviction from rented accommodation, loss of earnings, and expulsion of their children from schools (Members of the Sudanese society of people living with HIV/AIDS, personal communication, August 2008).

Failure to avert vertical HIV transmission eventually leads to increasing the burden of paediatric morbidity and mortality. The current prevalence of HIV infection in Sudanese children aged 0–14 years has been estimated to be 0.13% at the population level⁽⁴⁾. However, a significantly higher rate of 5.7% was recently observed among acutely hospitalised children aged 1.5–14 years in central Sudan⁽²³⁾.

The Sudan Household Health Survey (2006), which provided new data on critical child and maternal health indicators for more than 20 years, confirmed a staggeringly high maternal mortality of 1107 per 100,000 live births. Corresponding neonatal, infant and under-fives mortality rates were 41, 81 and 112 per 1000 live births, respectively⁽¹¹⁾. Higher maternal mortality rates attributed to obstetric as well as HIV-related causes have been documented in populations with high HIV prevalence⁽²⁴⁻²⁷⁾. However, the exact contribution of HIV infection to Sudan's high maternal mortality remains far from clear and therefore more research is needed to ascertain this.

Access and utilisation of existing maternal services

Family planning services were introduced in Sudan in 1965 by the Sudan family planning association⁽²⁸⁾. In 1985, family planning services were integrated into the primary health care system⁽²⁹⁾. Despite the availability of most contraceptive methods in Sudan, the use of male methods such as condoms and vasectomy is extremely low⁽¹¹⁾. To the best of

our knowledge, there are no centres dedicated to providing HIV-couples (whether sero-concordant or sero-discordant) with appropriate advice on safe sexual practices, post-exposure prophylaxis after sexual exposure, or fertility.

There are considerable disparities in the levels of access to ANC services between northern and southern states of Sudan⁽¹¹⁾. For example, this was zero per cent in Unity state in south Sudan compared to 89% in Khartoum state in the northern part of the country. However, >50% of available services did not fully meet expected standards of care even where such service is accessible⁽¹¹⁾. Current guidelines by the World Health Organisation (WHO) recommend a minimum of four ANC visits⁽³⁰⁾. The contents of such visits include the following as a minimum: blood pressure measurement, urine testing for bacteruria and proteinuria, blood testing to detect syphilis and severe anaemia, and optional measurement of weight and height. To the best of our knowledge, blood samples are usually obtained in Sudan to check haemoglobin levels and/or blood grouping and not treponemal serology on routine basis.

Despite considerable differences in levels of ANC access between urban and rural settings^(31,32), 63.7% of women received care by a skilled personnel at least once during their pregnancy⁽¹¹⁾. Furthermore, 45.5% of all Sudanese women had a blood sample taken during their antenatal visits. These findings are encouraging and will have direct implications on scaling up antenatal HIV testing in Sudan.

At present, at least four out of five deliveries in Sudan take place at home, but only one out of two deliveries is supervised by a skilled attendant⁽¹¹⁾. Furthermore, the mode of delivery is vaginal in 86.7%, instrumental in 2.1%, caesarean section in 4.5%, and missing or not ascertained in the remaining 6.7% of women⁽¹¹⁾. Of note, data on whether caesarean

sections were performed on elective or emergency basis were not recorded⁽¹¹⁾. Overall, these findings raise questions as to the frequency of elective caesarean sections among HIV-infected pregnant women and the likelihood of timely and appropriate administration of antiretroviral prophylaxis to them and their babies.

Prevention of mother-to-child-transmission of HIV infection

The risk of HIV transmission from mother-to-infant during pregnancy, delivery, and breast-feeding -in the absence of any intervention- has been estimated to be around 15-45%⁽³³⁻³⁶⁾. The risk of HIV transmission is enhanced by advanced maternal HIV disease as well as co-infection with herpes simplex virus or other sexually transmitted infections that cause ulcerative genital lesions^(1,37). Furthermore, there is evidence to suggest that placental malaria may increase the risk of HIV transmission⁽³⁸⁾. Examples of obstetric factors associated with vertical transmission of HIV include prematurity, prolonged rupture of membranes, and invasive procedures such as amniocentesis and monitoring of foetal scalp blood⁽¹⁾.

Current strategies employed to prevent mother-to-child transmission of HIV infection involve improving case detection during pregnancy, administration of antiretroviral therapy by week 28 of pregnancy, minimising exposure to invasive procedures, active management of labour including caesarean delivery for women with high HIV viral loads, and avoidance of breastfeeding in developed countries⁽¹⁾.

Infant feeding practices have major influence on the risk of mother-to-child transmission of HIV. Current HIV clinical guidelines in developed settings recommend complete avoidance of breastfeeding including women who are receiving long-term antiretroviral therapy for their own health⁽³⁹⁻⁴⁰⁾. However, exclusive breastfeeding is crucial to

improving survival of infants in resource-poor settings where diarrhoeal and respiratory infections are leading causes of morbidity and mortality. Therefore, the risk of HIV transmission through breast milk should be carefully weighed against the benefit of children's own survival in less developed countries⁽⁴¹⁾.

Recent evidence from the Kesho bora study (means "a better tomorrow" in Swahili), which was conducted in Burkina Faso, Kenya and South Africa, indicated that extending the course of antiretroviral therapy started in the third trimester of pregnancy and continued during breastfeeding until six months post-delivery conferred 40% reduction in mother-to-child transmission compared to breastfeeding infants whose mothers were not on concurrent antiretroviral therapy⁽⁴²⁾. In light of these results, WHO has revised its guidance on antiretroviral therapy during pregnancy by adopting two key approaches in less-developed settings⁽⁴³⁾. The first approach focuses on providing long-term antiretroviral therapy for pregnant women in need of treatment for their own health (judged by clinical staging or CD4 criteria) whereas the second approach is concerned with providing short-term antiretroviral prophylaxis for HIV infected women with no evidence of immune compromise in order to prevent mother-to-child transmission during pregnancy, delivery, and breastfeeding. It is anticipated that these approaches could reduce the risk of mother-to-child transmission to <5% in breastfeeding populations and to <2% in non-breastfeeding populations. Current paediatric practice in Sudan endorses exclusive breastfeeding for infants born by HIV-infected mothers, which is in line with previous WHO guidance, but clinicians and health policy makers in Sudan should take a note of the new evidence provided by the Kesho bora study and adapt current WHO recommendations to suit their local context.

The Sudan National AIDS Control Programme (SNAP) provides HIV services in 15 northern states through 94 voluntary counselling and testing (VCT) centres, 35 care and treatment centres, and seven centres dedicated for PMTCT⁽⁴⁴⁾. However, a major drawback to this service model is the fact that it runs parallel to the mainstream healthcare system and that it is devoid of any multidisciplinary links⁽⁴⁴⁾. At present, clinical governance systems in Sudan are not well-developed and therefore there are no established referral pathways between relevant clinical specialties looking after HIV-infected pregnant women. Apart from a few individual initiatives, clinical leadership in HIV management is extremely lacking due to high levels of stigma attached to HIV⁽⁴⁴⁾. Furthermore, HIV education is almost absent from both undergraduate and postgraduate medical training curricula despite Sudan's geographical location in sub-Saharan Africa, which is the most devastated region in the world by the HIV pandemic⁽⁴⁴⁾.

Overall, the current service delivery model for PMTCT in Sudan achieved <1% antenatal coverage for HIV testing and <10% coverage for antiretroviral therapy for HIV-infected pregnant women^(4,45). These figures are disappointing and therefore more concerted efforts must be exerted to improve accessibility and acceptability of antenatal HIV testing. There are no satisfactory explanations for the high refusal rates for HIV testing among Sudanese pregnant women. Mahmoud et al reported that factors such as age >26 years, primigravidity, and Islamic faith were associated with increased likelihood of HIV testing acceptability⁽⁴⁶⁾. However, these findings were not triangulated by qualitative data that might have helped improve our understanding of women's potential willingness to undergo HIV testing. High levels of social stigma lead to reluctance of both patients and providers to discuss HIV testing. Furthermore, the low uptake figures

for HIV testing in Sudan raise questions about the quality and consistency of healthcare workers' approaches to seek informed consent. Our own experience reveals that there is a lot of myth surrounding HIV counselling and testing in Sudan. Doctors, midwives and other health professionals have generally shied away from offering a concise yet informative pre and post-test discussion due to the widespread misconception that HIV testing requires input from dedicated professional counsellors.

Evidence from sub-Saharan countries reveals that offering routine HIV testing on an opt-out basis not only improved its uptake, but also improved coverage of antiretroviral prophylaxis as well as post-natal follow-up attendance^(47,48). Although current evidence suggests high default rates of 48% among Sudanese patients receiving antiretroviral therapy⁽⁴⁴⁾, there is no data on adherence among pregnant women in Sudan. Similarly, there are no published studies on maternal or perinatal outcomes of HIV-infected women.

Due to persistence of maternal HIV antibodies in infants, molecular diagnostic tests utilising the polymerase chain reaction (PCR) are needed for screening the newborns of HIV-infected mothers⁽¹⁾. However, PCR assays are not currently available for routine diagnostic use in Sudan and this, in turn, leads to significant delays in confirming the HIV status of these infants. Improving access to HIV serological and molecular diagnostics will help optimise the quality of care received by pregnant women and their newborns^(1,23). Furthermore, this will allow healthcare professionals and planners in Sudan to assess the efficiency of PMTCT interventions by obtaining precise estimates of averted vertical HIV infections.

In conclusion, the burden of maternal HIV infection in Sudan is currently low and this

fact in itself presents opportunities as well as challenges. What should be clear, however, is that there is no room for complacency as the epidemiological situation may change in future due to civil unrest, internal displacement, and sharing open borders with countries that have significantly higher HIV prevalence. Careful monitoring and evaluation of the situation through strong surveillance systems is of paramount importance.

The fact that two out of three Sudanese women received antenatal care by any skilled personnel at least once during their pregnancy and that approximately one out of two women had a blood sample taken during their antenatal visits present an excellent opportunity to provide point-of-care rapid HIV testing on an opt-out basis. Women of reproductive age should be targeted by an assertive, far-reaching, and sustained information, education & communication campaign in an effort to raise their awareness on PMTCT. Political commitment and support to PMTCT activities should be secured in order to facilitate future success.

Adopting an integrated multidisciplinary approach is crucial to delivering effective PMTCT service and the leadership of SNAP will need to consider innovative ways for engaging obstetricians, midwives, health visitors, physicians, paediatricians, and other health professionals in PMTCT activities. Adherence to standards of good medical practice such as preserving patients' dignity and confidentiality should be promoted. National clinical guidelines on PMTCT should be updated, made readily accessible to all practitioners, and get regularly audited. Further research into the impact of HIV on the health of women and children in Sudan is urgently needed.

Conflict of interest: None to declare.

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Tuberculous meningitis in HIV negative adult Sudanese patients: clinical presentation and out come of management

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الملخص

الخلفية:-

مرض الدرن عادة ما يصيب الرئة لكنه يتميز ايضا باصابه اعضاء الجسم المختلفة. اصابة الجهاز العصبي تحدث في 10% من المرضى الذين لديهم درن خارج الجهاز العصبي. مرض الدرن السحائي هو عادة ما يصيب الاطفال في الدول التي تتميز بنسبه اعليه لمرض الدرن مثل السودان.

طريقة الدراسة:-

في السودان هنالك ندرة في المعلومات حول تشخيص علاج مرض الدرن السحائي عند البالغين. في هذه الدراسة المستمرة التي اجريت بمستشفى الشعب بالخرطوم.

تم دراسة 10 مرضي مصابين بمرض الدرن السحائي ، حيث تم استعراض اعراض المرض ونتائج الفحوصات بما فيها الرنين المغنطيسي للدماغ ومتابعه المحصله النهائية للعلاج.

النتيجة والمناقشة:-

كل المرضي عانوا من : حمي ، صداع ، تصلب الرقبه مع ايجابية علامه كيرنج.

6 من المرضي ثبتت اصابتهم بالسل خارج الجهاز العصبي. تفاعل البوليمريز المكوثر (PCR) الخاص بالسل في السائل النخاعي وجد ايجابي في 7 من اصل 9 مرضي . المحصله النهائية للمعالجه توفي ثلاث من المرضي، تعافى مريضان تماما ، في حين ان البقيه (5 مرضي) تعافوا مع وجود بعض المضاعفات.

الخلاصة:-

ان درن سحايا الدماغ مرض خطير عادة ما يتم التغافل عنه خاصه في المرضي غير المصابين بالايذز، وهو يشابه الكثير من امراض الجهاز العصبي المختلفه.

ان BMRC ان تعافى المريض يعتمد علي مدي وخامة المرض عند التشخيص.

Abstract

Although TB most commonly involves the lungs, it can produce disease in nearly every organ system. Nervous system involvement is seen in up to 10% of patients with systemic tuberculosis. In countries with a high incidence of tuberculosis, like Sudan, tuberculous meningitis is typically a disease of young children and uncommon in adults.

Patients and Methods

In Sudan, there is paucity of information regarding the diagnosis and management of CNS tuberculosis. In this longitudinal hospital based study, we included 10 adult patients

based study, we included 10 adult patients with tuberculous meningitis. The clinical presentation, laboratory findings including MRI and outcome of treatment were discussed.

Results

Fever, headache, nuchal rigidity and positive Kernig's signs were found in all patients. Extraneural tuberculosis was found in 6 patients and CSF PCR for tuberculosis was positive in 7 out of 9 patients. Three patients died, 5 recovered with residual deficit and only 2 recovered completely.

Conclusions

Tuberculous meningitis is a serious condition and commonly overlooked especially in HIV negative patients. It is a great mimicker of various neurological conditions. The prognosis depends on the BMRC stage of disease.

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Keywords: Tuberculosis, Tuberculous meningitis, Sudan.

Introduction

Tuberculosis is a major cause of morbidity and mortality throughout the world especially in the developing countries. The world health organization estimated that one third of the world's population is infected with tuberculosis⁽¹⁾. In 1999 eight million people developed tuberculosis world wide with 2.6 – 2.9 million deaths. The majority of cases occurred in Asia and Africa with increasing number in patients infected with HIV⁽²⁾.

Although TB most commonly involves the lungs, it can produce disease in nearly every organ system. Nervous system involvement is seen in up to 10% of patients with systemic tuberculosis⁽³⁾. Neurological tuberculosis may develop during primary infection or reactivate as a consequence of immunosuppression. In countries with a high incidence of tuberculosis, tuberculous meningitis is typically a disease of young children that develops 3-6 months after primary infection. In countries with a low incidence, it more commonly affects adults. It may follow primary infection, but more commonly due to reactivation of a dormant sub cortical or meningeal focus⁽⁴⁾. Tuberculomas, the parenchymal form of CNS tuberculosis, occur as single or multiple brain or spinal lesions and present with symptoms and signs of space-occupying lesions. Skeletal TB constitutes 35% of extra pulmonary disease with the spine affected 50-60% of the times⁽⁵⁾. Pott's disease results from an infection of the bone by the Mycobacterium Tuberculosis bacteria via a combination of haematogenous route and lymphatic drainage. The organism may stay dormant in the skeletal system for an extended period of time before the disease can be detected⁽⁶⁾. Tubercular brain abscesses are

very rare. Only 57 cases were reported in the world literature⁽⁷⁾.

The diagnosis of CNS tuberculosis still remains difficult in spite of the advent of the new imaging modalities like CT scan and MRI and the facility of DNA testing. A high index of suspicion is necessary for timely diagnosis and prompt initiation of therapy. AFB smears on CSF are positive in 10-90% of patients; sensitivity can be improved if large volumes of CSF from multiple lumbar punctures are centrifuged^(8,9,10).

CSF culture for meningitis tuberculosis is positive in 45-90% of cases^(8,9,10).

CSF PCR for meningitis tuberculosis has a variable sensitivity and specificity, and therefore should not be used to exclude tuberculous meningitis⁽¹¹⁾.

The emergence of drug-resistant strains of meningitis tuberculosis is a serious public health problem. Drug resistance has been reported in Sudan by Sharaf-Eldin et al in smear positive patients⁽¹²⁾. Fifty patients with persistent disease and amplifiable meningitis tuberculosis were included. Mutations were identified in the genes conferring resistance to INH (Kat G, 12%), RIF (rpoB, 8%), SM (rpsl and rrs, 30%), EMB (embB, 4%) and 2 patients (4%) had mutations to both INH and RIF. Another study carried out in Khartoum, Gezira and camps for displaced people showed high incidence of drug resistance⁽¹³⁾.

In Sudan, there is paucity of information regarding the diagnosis and management of CNS tuberculosis. It remains a real diagnostic and management challenge.

There were no studies addressing the problem of tuberculosis of the nervous system in respect to clinical diagnosis, management, imaging characteristics, ZN staining, culture and PCR on CSF and other specimens.

This study is designed to address these problems.

Objectives

- To describe the different clinical presentations of tuberculous meningitis
- To assess the response to medical treatment
- To outline predictors of outcome

It is a prospective, hospital-based, longitudinal study.

Patients and methods

- The study was carried out in Shaab and Khartoum Teaching Hospitals, Khartoum, Sudan, during the period from February 2002 to November 2009.
- Ten adult patients (16 years or more) were included and eight patients excluded.
- Written consent of patients or relatives was taken.
- Full history, clinical examination, diagnosis and management of all patients were carried out by the investigators.
- About 10 ml of CSF was taken from each patient using standard methods⁽¹⁴⁾ for: cytology, biochemistry, gram and ZN staining and PCR testing for mycobacterium tuberculosis.
- Sputum and blood PCR testing for tuberculosis was carried on all patients.

DNA detection of Mycobacterium tuberculosis in biological samples.

Samples

Sputum and Cerebrospinal fluid. Samples were collected in sterile plain tubes and stored at 4 degree C or immediately processed.

Following the centrifugation of the samples at 2000rpm/15 minutes, suspend the pellets in lysis buffer using Cinnagen DNA extraction kit.

PCR amplification of MTB DNA

5 ul of extracted DNA was mixed with 20ul 1X PCR mixture, 0.3ul Taq-DNA polymerase using Cinnagen MTB PCR kit. The DNA was amplified using the following PCR cycles: 93 C for 60 sec; 72 C for 30 sec for one cycle, followed by 37 cycles of 93C for 20 sec; 72C

for 30 sec and a final cycle of 93C for 20 sec; 72C for 120 second.

Analysis of results

10 ul of the PCR amplified DNA was electrophoresed in 2X agarose and stained with Ehtidium boride for detection of the 163 bp fragment specific for Mycobacterium tuberculosis

Bacteriology

Biological samples were studied by microscopy using the following stains:

Gram stain, ZN stain

Inclusion criteria

Only patients with the diagnosis of definite or highly probable tuberculous meningitis were included, essentially as described and validated by Ahuja and colleagues⁽¹⁵⁾.

Presence of fever and headache lasting more than 14 days, with or without vomiting, alteration of sensorium or focal deficit;

Presence of AFB on CSF smears stained with Ziehl-Neelsen (ZN) stain or culture (B1). And absence of other bacteria ad fungi, as well as malignant cells, in CSF (B2);

CSF pleocytosis with more than 10 cells/ml (more than 60% lymphocytes) (C1), and CSF concentrations of protein greater than 0.6 mg/ml (C2) and of glucose less than 60% of the corresponding blood level (C3).

Evidence of extraneural tuberculosis

We used PCR testing instead of culture of Mycobacterium tuberculosis.

Five groups were identified as different combinations of the above mentioned criteria:

- Definite tuberculous meningitis (A+B1+B2)
- Highly probable tuberculous meningitis (A+B2+C1+C2+C3+D)
- Probable tuberculous meningitis (A+B2+two of the criteria C1,C2,C3 or D)
- Possible tuberculous meningitis (A+B2+ one of the criteria C1,C2,C3 or D)
- Other disease (absence of A or B2).

Group I and 11 patients were included (10 patients).

Group 111, 1V and V were excluded (8 patients).

Exclusion Criteria

- Children less than 16 years of age.
- Patients with the above criteria 111,1V and V.
- Patients with HIV.
- Patients with malignancy.
- Patients on immunosuppressant drugs.

Staging of tuberculous meningitis according to severity

Patients with tuberculous meningitis were classified into 3 stages according to severity, using the classification suggested by the British Medical Research Council (BMRC)⁽¹⁶⁾. Stage I: Patients were conscious and had mainly non-specific symptoms, with or without signs of meningeal irritation, but no focal neurological signs. Diagnosis was established mainly on CSF findings.

Stage II: Patients were mentally confused and/or had neurological signs.

Stage III: Patients were comatose and had gross neurological signs

Medical treatment

Consisted of the following drugs:

- Streptomycine (dose 10 mg/kg /day), or Ethambutol (25 mg/kg day)
- INH (5-10 mg/kg/day)
- Rifampicin (10 mg/kg/day)
- Pyrazinamide (35 mg/kg/day)
- Pyridoxine 40 mg/day)

After 2 months of treatment Streptomycin or Ethambutol and Pyrazinamide were stopped and Rifampicin, INH and pyridoxine continued for another 10 months

All patients were supervised and side effects of drugs were looked for.

Monthly visual acuity and colour vision were checked for patients on Ethambutol, to monitor for toxic optic neuropathy.

Monthly hearing evaluation was conducted for patients on Streptomycin, to monitor for ototoxicity.

Monthly evaluation of liver enzymes were done for all patients (INH, Rifampicin and Pyrazinamide)

Neuroimaging studies were performed initially for all patients and then at about 3 months, 6 months and at the end of 12 months of treatment.

At the end of the 12 months course of treatment, the patients were evaluated clinically and by investigation to ensure complete resolution of disease activity.

Statistics: All necessary data were fed to IBM compatible computer, using SPSS statistical package for analysis.

Results

Demographic characteristics: (Table1)

Table 1: Demographic characteristics and Symptoms in 10 patients with tuberculous meningitis

Pt No	Sex	Age	Occupation/ duration of illness before treatment(days)	Symptoms							
				Fever	Headache	Neck ache	Double vision	Blurring of vision	Seizures	Weakness	
1	M	29	Student	120	+	+	+	+	+	+	-
2	M	54	Farmer	60	+	+	+	-	-	-	-
3	F	30	Medical Doctor	5	+	+	+	+	+	-	R hemiparesis
4	F	22	Student	60	+	+	+	+	-	-	-
5	M	18	Student	30	+	+	+	-	+	+	-
6	F	18	Student	30	+	+	+	-	-	-	paraparesis
7	M	23	student	14	+	+	+	-	-	-	-
8	M	40	Butcher	20	+	+	+	+	+	-	R hemiparesis
9	F	18	Student	14	+	+	+	+	+	-	R hemiplegia
10	F	24	House wife	14	+	+	+	-	-	-	-

Ten adult patients with definite or highly probable tuberculous meningitis were studied (group1 and11). Five were males and five females. Their ages ranged between 18 to 54 years (mean age 27.6, median 23.5, +/- SD 11.5 years).

Six (60%) patients were students, two (20%) house wives, one (10%) medical doctor and one (10%) butcher.

Clinical Presentation: (Table 1 and 2)

Symptoms at presentation: (Table 1)

Duration of symptoms before presentation ranged between 5 and 120 days (mean 36.7 days).

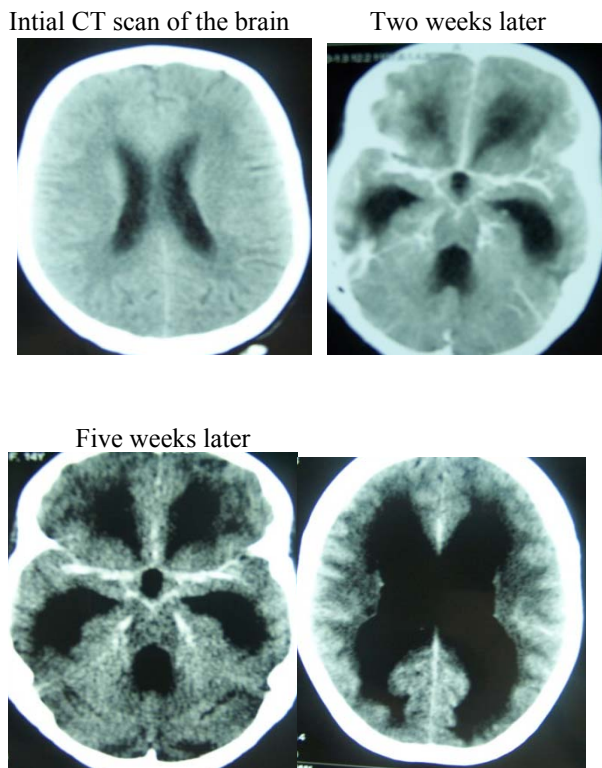
All patients had fever, headache and neck stiffness (100%), and five (50%) had impaired vision and another five had double vision (50%). Two (20%) had seizure disorder and 4 (40%) had motor limb weakness.

Signs in the first 3 months of presentation:
(Table 2, Figures 1 & 2).

Table 2: Neurological Signs in 10 patients with tuberculous meningitis

Signs in the first 3 months of treatment	Patients	Percentage
Nuchal rigidity	1,2,3,4,5,6,7,8,9,10	100%
Kernig's sign	1,2,3,4,5,6,7,8,9,10	100%
Brudzinsk's Sign	1,3,5,8,9	50%
Cranial nerve palsies	1 (Bil 6 th), 3 Bil 6 th , R 3,4,7 th , 4 (R 6 th) 5 (L 3 rd) 7 (L 6 th) 8 (Bil.6,7, L 5 th , R 12 th) 9 (R 7 th)	70%
Papilloedema	3,4,5,6,8,9	60%
Optic atrophy	7 (bilateral)	10%
Motor weakness	2 (Quadripareisis 3 (R hemiplegia) 5 (quadripareisis 6 (Paraparesis) 8 (R hemiparesis) 9 (R hemiplegia)	60%
Extra neural TB	1 (Miliary TB + R Supra clavicular LN abscess) 2 (Hilar LNs) 3 (L basal consolidation+ minimal effusion) 5 (R Upper lobe consolidation) 6 (Miliary tuberculosis) 8 (R cervical LN abscess) 9 (R cavitary TB)	70%

Fig 1: For patient number 4
Showing evolution of disease within 5 weeks as shown on serial CT scans of the brain.
(Essentially normal initial scan, followed by progressive meningeal enhancement and hydrocephalus and then the effect of medical treatment and shunting)



Two weeks after shunting

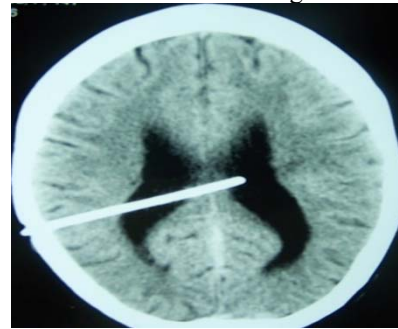
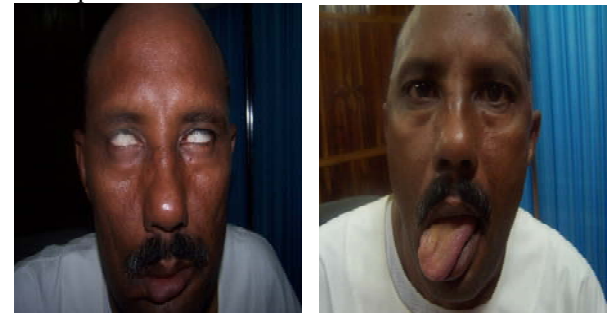


Fig 2: For patient No 8
Fig 2(a): Showing abscess formation in right cervical lymph node six weeks following start of antituberculosis treatment



Fig 2(b): Showing bilateral LMN Facial and right 12th nerve palsies



Initial BMRC scale was one in 4 (40%) patients, 2 in 3 (30%) and 3 in 3 (30%). Nuchal rigidity and a positive Kernig's signs were found in all patients (100%). Brudzinsk's sign was positive in 5 (50%) patients. Cranial nerve palsy was reported in 7 (70%) patients, the commonest cranial nerves affected were the 6th nerve in 5 (50%) patients, the 3rd in 2 (20%), the 7th in 2 (20%), the 4th in one (10%), the 5th in one

(10%) and the 12th in one (10%). Papilledema was found in 6 (60%) patients and optic atrophy in one (10%). Motor weakness of limbs was found in 6 (60%) patients, (right hemiplegia in 3 (30%), quadripareisis in 2 (20%) and paraparesis in one (10%)). Extranatural tuberculosis was found in 7 (70%) patients (five (50%) patients with some form of pulmonary tuberculosis, one (10%) patient with military tuberculosis and cervical tuberculous lymphadenopathy and one (10%) patient with isolated cervical lymphadenopathy.

Laboratory and imaging findings:
(Tables 3, 4 and 5)

Table 3: Investigations in 10 patients with tuberculous meningitis

Patient no	Tuberculin test	HB grams/dl	TWBC	ESR	HIV test	CXR	Sputum PCR
1	Negative	11	9700	68	Negative	Miliary TB	Positive
2	14 mm	08	8500	70	Negative	Hilar Lymphadenopathy	Negative
3	22	10	14500	77	Negative	L basal consolidation + minimal effusion	Positive
4	15	11	2700	29	Negative	NAD	Negative
5	24	8.5	7800	60	Negative	R upper Lobe consolidation	Positive
6	Negative	12	4500	19	Negative	Miliary TB	Positive
7	16	9.8	12800	70	Negative	NAD	Negative
8	Necrotic	14.6	9100	104	Negative	NAD	Negative
9	Not done	8.7	18000	70	Negative	R Cavitatory TB	Positive
10	Necrotic	10	8800	58	Negative	NAD	Negative

Table 4: CSF Findings in 10 patients with tuberculous meningitis:

Patient no	1	2	3	4	5	6	7	8	9	10
Protein	120	140	110	179	210	140	93	140	Not done	135
Total WBC	60	35	115	65	38	30	60	800	Not done	400
Lymphocytes %	70	47	100	70	86	80	80	30	Not done	94
polymorphs	30	53	0	30	14	20	20	70	Not done	06
Sugar	63	87	22	40	50	24	114	50	Not done	44
PCR	+	+	+	+	+	+	-	-	Not done	+
ZN Stain	-	-	-	-	-	-	-	-	Not done	-

Table 5: MRI Findings of the Brain in 10 patients with tuberculous meningitis

MRI Findings	Initial MRI	Follow up MRI (1-3 months)	MRI Findings at the end of treatment
Meningeal enhancement	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5,6,7,8,9,10	All Cleared
hydrocephalus	NAD	4, 6	4,6 (Shunted)
Tuberculoma	1 (L Hypocampal), 4 (multiple cerebellar and temporal lobes, 9 (Multiple basal)	1 (Increase in size), 2 (R pontine), 4 (getting smaller) 9 (increasing in No and size)	1 (Resolved) 2 (Died) 4 (Resolved) 9 (Died)
Infarctions	NAD	2 (multiple bilateral Cerebral)	2 (Died)

Tuberculin test: was positive in 8(80%) patients, negative in one (10%) and not done in one patient.

Erythrocyte Sedimentation Rate (ESR): It ranged between 19 to 104 mm in first hour. (The mean was 62.5 +/-SD 35.3)

WBC ranged between 2700 to 18000 cells/ cu mm (mean 9640 +/- SD 4518.6)

Haemoglobin ranged between 8 to 14 grams/dl (mean 10.36 +/- SD 1.9)

HIV test: all patients were HIV negative.

Chest X-ray: It was abnormal in 6 (60%) patients (It showed evidence of military tuberculosis in 2 (20%), right cavitatory disease in one (10%), hilar lymphadenopathy in one (10%), left basal consolidation with minimal pleural effusion in one (10%) and right upper lobe consolidation in one (10%) patient).

Sputum PCR for tuberculosis: It was positive in 5 patients (50%) and negative in others (50%).

Cerebrospinal fluid (CSF): It was done for 9 (90%) patients, the other patient died before lumber puncture. Protein level was high in all patients. It ranged between 93 and 210 mg/ dl (mean 140.8 +/-SD 35.3), White cell count ranged between 30 and 800 cells/ cu mm (mean 178 +/- SD 260.5); lymphocyte percentage ranged between 30% to 100% (mean 73 +/-SD 22.3) and polymorphs ranged between 0% to 70% (mean 27+/-22.3 SD). Glucose level ranged between 22 mg/dl and 114 mg/dl (mean 54+/- SD29.6).

PCR for Mycobacterium tuberculosis was positive in 7 (70%) patients, negative in 2 (20%) and not done in one patient.

Initial MRI scans of the brain: It showed meningeal enhancement in all 10 (100%) patients, tuberculomata of the brain in 3 (30%) patients and no evidence of hydrocephalus or infarction.

Follow up MRI findings in the first 1-3 months: It showed meningeal enhancement in all Patients (100%), tuberculomata of the

brain in 4 (40%) patients, hydrocephalus in 2 (20%) and cerebral infarction in one (10%). MRI of the brain findings at the end of treatment: Meningeal enhancement cleared in all patients who were alive, 2 (20%) patients shunted for hydrocephalus and tuberculomata resolved in the remaining 2 alive patients.

Outcome of treatment: (Table 6)

Table 6: Outcome of treatment in 10 patients with tuberculous meningitis

Patient	BMRC	Initial Neurological signs	New signs while on treatment	Neurological signs after completion of treatment	Outcome
1	2	Bil 6 th , Seizures	Increased size of tuberculoma	NAD	Full recovery
2	2	NAD	R pontine tuberculoma, - Multiplicerebral infarctions, papilloedema, Coma	Died after 6 weeks of treatment	Died
3	3	Bilateral 6 th	-R 3 rd , 4 th , 7 th , - papilloedema R hemiplegia	Bilateral optic atrophy = FC	Partial Recovery
4	1	R 6 th	hydrocephalus, papilloedema	Bilateral Optic atrophy = reading big Fonts	Partial recovery
5	3	L 3 rd , quadriparesis	Coma	Died after 2 weeks of treatment	Died
6	1	Papilloedema, paraparesis	Obstructive Hydrocephalus at aqueduct	Bil Mild Optic atrophy, paraparesis	Partial Recovery
7	1	L 6 th , Bil optic atrophy	NAD	Bilateral optic atrophy, R blind, L CF	Partial Recovery
8	2	Bil 6 th , 7 th , L 5 th , R 12 th , R hemiplegia, papilloedema	Appearance of L cervical LN abscess	Bil 7 th and R 12 th	Partial recovery
9	3	R 7 th (UMN), R hemiplegia	Coma	Died 4 days after starting treatment	Died
10	1	NAD	NAD	NAD	Full Recovery

Development of new signs after starting treatment: Eight (80%) patients developed new signs or showed increase in size of the existing lesions.

Outcome at the end of treatment: Two (20%) patients recovered completely, 3 (30%) died and 5 (50%) recovered with residual deficit. The brunt of deficit was on the cranial nerves (bilateral optic atrophy in 4 (40%) patients, bilateral 7th and right 12 in one patient and paraparesis in one (10%).

Discussion

Tuberculous meningitis is still the most serious form of tuberculosis and carries a high mortality and morbidity. In endemic areas TBM is a disease of early childhood⁽¹⁷⁾, where as in non-endemic areas TBM is a disease of adulthood. Risk factors for the last group were HIV infection, age, alcoholism, diabetes

mellitus, malignancy and use of corticosteroids^(18, 19, 20, 21).

Uncertainty dominates all aspects of tuberculous meningitis (TBM). The variable history and clinical presentations contribute much to the delay in diagnosis and management and hence the outcome. The conventional diagnostic tools are usually unreliable and lack sensitivity and specificity. Ziehl-Neelsen staining lacks sensitivity and culture results are often negative and give much uncertainty and undue delay to the diagnosis and treatment.

Tuberculin testing is of limited value, especially in endemic areas like Sudan. Early studies found 22% of those with TBM were negative to 100 units PPD⁽²²⁾. A recent study demonstrated cumulative reactivity with 10–100 units PPD to be 75 %⁽²³⁾. Some studies suggest that tuberculin testing may be more useful in children, with 86% having greater than 15 mm of induration with 5 units purified protein derivative (PPD)⁽²⁴⁾. In our series, it was negative in 2 out of the 9 tested patients (22.2%).

The new rapid diagnostic methods, like Polymerase Chain Reaction (PCR) are not readily available in developing countries where the burden of disease. PCR offers a rapid and fairly accurate diagnosis of tuberculous meningitis^(25,26). Although specificity and sensitivity as high as 100% have been reported, until there is advancement in PCR technique, this test alone is insufficient as a single diagnostic test for tuberculosis^(27, 28).

In this study, a positive PCR for M tuberculosis was obtained in 7 (77.8%) out of 9 patients.

Classic presenting features of TBM are not uncommon and high index of suspicion is required. Almost all the available series of TBM reported in the literature stress the importance of early diagnosis and the prompt institution of chemotherapy⁽²⁹⁻³⁴⁾. Delay in

treatment either result in death, or substantial neurological morbidity⁽³⁵⁾.

The nature of neurological complications that can occur can be predicted from an understanding of the pathogenesis of TBM. Adhesions can result in cranial nerve palsies (Especially II, III, IV, VI, VII, and VIII), constriction of the internal carotid resulting in stroke, and obstruction of CSF flow leading to raised intracranial pressure, reduced conscious level, and hydrocephalus.

Diagnosis is dependent on lumbar puncture and CSF examination. Abnormalities in the CSF depends on a tuberculin reaction within the subarachnoid space. Those with depressed cell mediated immunity may have atypical findings in the CSF.

Lymphocytosis of between 100 and 1000 cells/mm³ is more usual, although in the first 10 days polymorphonuclear leucocytes may predominate⁽³⁶⁾. A raised CSF protein occurs in the majority, and CSF glucose will be reduced in 70 %^(30, 36).

The advent of CT and MRI has provided insight into disease progression, and gives prognostic and diagnostic information^(37,38). Both CT and MRI of the brain will disclose hydrocephalus, basilar meningeal thickening, infarcts, oedema, and tuberculomas.

The incidence of hydrocephalus is greater in the young, and increases with duration of the illness. In children hydrocephalus is almost always present after 6 weeks of illness⁽³⁷⁾. Infarcts are seen on CT in 28%, with 83% occurring in the middle cerebral artery territory⁽³⁹⁾. The basal ganglia are the most commonly affected region.

Magnetic resonance imaging has increased sensitivity in detecting the distribution of meningeal inflammatory exudates and other lesions⁽³⁹⁾.

Important mimickers include cryptococcal meningitis, cytomegalovirus encephalitis, sarcoidosis, meningeal metastases, and lymphoma.

Before the introduction of chemotherapy TBM was almost universally fatal. Cases of transient self limiting TBM are reported in the literature⁽⁴⁰⁾, but these are exceptional.

Generally, the consensus is to combine isoniazid, rifampicin, and pyrazinamide as initial treatment. The addition of the fourth drug is left to local choice and experience, with little evidence to support the use of one over the other.

There is conflicting evidence for the duration of treatment. The current United Kingdom guidelines recommend 12 months in uncomplicated cases of TBM (including cerebral tuberculoma without meningitis), extending to 18 months should pyrazinamide be omitted⁽⁴¹⁾.

The rationale behind the use of adjuvant corticosteroids lies in reducing the harmful effects of inflammation as the antibiotics kill the organisms. Corticosteroids do not seem to reduce the proinflammatory cytokines found in the CSF of those with TBM⁽⁴²⁾. Although the mechanism remains obscure, clinical trials suggest that corticosteroids have a beneficial effect in some groups of patients and a consensus has emerged that adjuvant corticosteroids should be used in those presenting with MRC stage II or III TBM^(41, 43, 44).

Neurological deterioration occurring in a patient under treatment for TBM may have various causes, and requires urgent radiological assessment. Rising intracranial pressure requires active management. Hydrocephalus is a common complication that may lead to permanent neurological damage or death if left untreated. Prompt assessment by CT is of value in both diagnosis and management⁽³⁸⁾.

Development of new neurological signs during anti tuberculous therapy was also observed. It could be a paradoxical reaction and unlikely due to ineffective or inappropriate agents as most of the newly developed complications resolved with

continued treatment. Paradoxical reaction during effective antituberculous treatment is well known phenomenon^(45,46,47). It may be due to complex interaction between the host immunity and the M tuberculosis and usually subsides with continued anti TB treatment or addition of corticosteroids^(45,46,47).

Case fatality rate in our series was (30%) and is comparable to many studies world wide^(48,49). The case fatality of tuberculous meningitis is one of the highest in neuroinfections and hence, high index of suspicion and empirical initiation of prompt treatment pending the results of investigation is crucial.

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Antibiotics prophylaxis in elective surgery in Khartoum Teaching Hospital: current practice and surgical site infection

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استعمال المضاد الحيوي الوقائي في العمليات الجراحية غير الطارئة في مستشفى الخرطوم: الوضع الراهن ونسبة التهاب الجروح المصاحبة

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استعمال المضاد الحيوي للوقاية في العمليات الجراحية عمل مقبول ولكن مع عدم وجود ضوابط يؤدي إلى كثير من المضاعفات . تهدف هذه الدراسة لمعرفة كيفية الاستعمال وتوقيته والالتهابات التي تحدث بعد الجراحة .
هذه الدراسة مستقبلية لثلاثمائة مريض في أربعة عمليات جراحية وهي : تصليح الفتاق / إزالة ورم من الثدي / إزالة غدة درقية وإزالة المرارة .
تمت متابعة المرضى لفترة 30 يوما لحدوث أي التهاب في الجرح .
كانت نسبة الالتهابات في كل العمليات 8% .
كانت الالتهابات في العمليات النظيفة 7.8% (5.4% في تصليح الفتاق / 9.6% في عملية إزالة الغدة و 1.8% في عمليات الثدي) وكانت النسبة 8.6% في عمليات إزالة المرارة . كان هنالك تفاوت ملحوظ في نسبة الالتهاب بين الوحدات الجراحية في المستشفى (1.6% إلى 19.1%) .
كان استعمال جرعة واحدة من المضاد هي الأكثر يليها استعمال المضاد بالوريد لمدة 24 ساعة ثم يليها استعمال المضاد بالفم لمدة 5 يوم بنسبة 22% ثم استعمال المضاد الوريدي أكثر من 24 ساعة ثم استعمال الفم لمدة 5 أيام بنسبة 38% .
ثبتت الدراسة عدم وجود برنامج لاستعمال المضادات الحيوية الوقائية وعدم وجود تنسيق بين الوحدات الجراحية .
كانت نسبة التهاب الجروح اقل في العمليات التي استعمل فيها جرعة وريدية واحدة عند إجراء الجراحة .
لا بد من عمل برنامج موحد لاستعمال المضادات الوقائية للعمليات الجراحية غير الطارئة .

Abstract

Prophylactic use of antibiotics in surgery is a common practice; however, in absence of clear guidelines, its use may be counterproductive. This study is on the current practice of prophylactic use of antibiotic in all surgical units in Khartoum Teaching Hospital (KTH), its timing, regimen and the rate of postoperative surgical site infection.

Patients and methods

This is a prospective observational study of 300 patients who underwent 4 surgical procedures namely: hernia repair, breast lump excision or mastectomy, thyroidectomy and cholecystectomy. All patients were followed postoperatively for 30 days in the referred

clinic or by phone for evidence of surgical site infection (SSI). Data was collected from the 5 surgical units as regard to antibiotics prophylactic regimen adopted and the SSI in each surgical unit. Statistical analysis was done using SPSS14; both frequencies and chi squares were calculated.

Results

The overall SSI rate was (8%). In clean surgery it was (7.8%), {being (5.4%) for hernia repair, (9.6%) for thyroid operations, (10.8%) for mastectomy and none for lumpectomy}. In clean contaminated surgery, namely following open cholecystectomy SSI was (8.6 %). There was a significant variation in the reported wound infection rate between different surgical units (1.6% to 19.1%, $p < .001$). There was also great variation in antibiotic use by different units for different types of surgery. Single preoperative IV prophylactic dose being the commonest regimen used in (41.4%) of patients followed

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by a 5-7 days course in (38%). There was a significant difference in SSI rates between different regimens with single preoperative dose having the least SSI rate (1.6%) ($p < 0.001$).

Conclusion

There was no uniformity in prophylactic antibiotic prescription between the five surgical units in KTH. A single pre operative IV prophylaxis was practised in 41% of patients, while 38% had postoperative course of oral antibiotics for 5 – 7 days. The overall SSI was 8%; being least in those given a single pre operative IV dose. Adherence to proper and aseptic surgical technique is more important than antibiotics prophylaxis to prevent SSI in clean wounds. Local guidelines should be laid down for prophylaxis antibiotic use in surgery based on the local bacteriological sensitivity.

Key words: antibiotics, sepsis, wound, bacteria.

Introduction

The CDC definitions of incisional and deep surgical wound infection by Horan et al 1988 were updated and replaced in 1992 by three categories: a) superficial incisional surgical site infection (SSI) (skin and subcutaneous fat), b) deep incisional SSI (fascia and muscles) and c) organ/space SSI definitions⁽¹⁾. As early as 1964, Bernard and Cole⁽²⁾ reported the successful use of prophylactic antibiotics in a randomized, prospective, placebo-controlled clinical study of abdominal operations on the gastrointestinal tract. There is no single, objective gold standard test for surgical wound infection⁽³⁾, and diagnosis is based variably on the presence and severity of a number of properties. Furthermore, judgment of wound status is highly subjective and at risk of intra- and inter-observer variation.

The frequency of surgical wound infection is difficult to monitor because criteria for diagnosis might not be standardized. A survey sponsored by the World Health Organization

demonstrated a prevalence of nosocomial infections varying between 3-21%, with wound infections accounting for 5-34% of the total⁽⁴⁾.

For antibiotics, the most commonly measured effect is the inhibition of microbial growth. One of the aims of rationalising surgical antibiotic prophylaxis is to reduce the inappropriate use of antibiotics thus minimising the consequences of misuse. Rates of antibiotic resistance are increasing in all hospitals⁽⁵⁾.

This work aims to study the current antibiotic prophylaxis in three clean operations and one clean contaminated procedure in the 5 surgical units in Khartoum Teaching Hospital and to report in the incidence of SSI up to the 30th postoperative day.

Patients and Methods

This is a prospective observational study conducted in Khartoum Teaching Hospital (KTH) including 300 patients between Jan-Aug 2008. Three clean surgical procedures were chosen: hernia repair, thyroidectomy and breast procedures (lumpectomy and mastectomy) and one clean contaminated procedure: cholecystectomy. Patients were consented verbally and all pre – and post-operative data from the 5 surgical units in KTH was entered in a data sheet. Patients were followed in the referred clinic and by telephone contact on day 5,10,14 and 30. Surgical wounds were classified according to the National Academy of Science (Table 1).

Table 1:

Classification of Wounds National Academy of Science 1964	
• Clean:	an uninfected operative wound with no inflammation where Gast T, Resp T, Genit T, uninfected UT not entered.
• Clean-contaminated:	operative wound where the tract entered under controlled conditions and without unusual contamination.
• Contaminated:	open, fresh or accidental wounds, operation with major break in sterile technique or gross spillage from GI.
• Dirty or infected:	old traumatic or with devitalized tissues and those with clinical infection.

Wound infection was diagnosed and scored according to ASEPSIS scoring system (Tables 2,3 & 4).

Table 2:

ASEPSIS SCORE		
Criterion	Description	Points
• Additional tt	Antibiotics	10
	Drainage of pus under LA	5
	Debridement under GA	10
• Serious discharge	Daily	0.5
	Daily	0.5
• Erythema	Daily	0.10
• Purulent exudates	Daily	0.10
• Separation of deep tissue	Daily	10
• Isolation of bacteria		5
• Stay in hospital over 14 d		

ASEPSIS:
A: additional treatment S: serous discharge, E: erythema, S: separation of deep tissues, I: isolation of bacteria, S: stay as inpatient, P: purulent exudate

Table 3:

Point scale for the wound inspection						
Wound Characteristics	Proportion of wound affected					
	0%	<20%	20-39%	40-59%	60-79%	>80%
• Serous discharge	0	1	2	3	4	5
• Erythema	0	1	2	3	4	5
• Purulent discharge	0	1	2	3	4	5
• Separation of deep tissues	0	1	2	3	4	5

Table 4:

Total score & category infection	
Total score	Category infection
0-10	Satisfactory healing
11-20	Disturbance of healing
21-30	Minor infection
31-40	Moderate infection
More than 40	Severe infection

Patient with ASEPSIS score above 10 points were considered as having SSI. Data was analysed and processed by SSPS version 14 computer system and Pearson chi square were calculated. The following patients were excluded: diabetics, those with malignant disease, those on steroids, patients with a hernia that required mesh repair and patients with strangulated hernia requiring resection and anastomoses.

Results

A total of 300 patients were studied, the female to male ratio was 1.0:1.9. Fifty-two percent of patients were below 40 yrs and only 9.7% were above 60 years of age. The body mass index

(BMI) was <20 in 14.3%, between 20-25 in 59.7%, >25 - 30 in 22.3% and >30 in 3.7%. Patients with clean operations accounted for 80.6% (breast, hernia and thyroid), while (19.4%) had clean-contaminated surgery (cholecystectomy). A hundred and eleven patients (37%) had hernia operations, 94 (31.3%) had thyroidectomy, 37 patients (12.3%) had breast surgery (19 had mastectomy and 18 had lumpectomy) and 58 patients (19.3%) had cholecystectomy.

The operative time was 1 to 2 hrs in 66.3%, more than 2 hrs in 7.2% and less than 1 hr in 26.3% of patients. The preoperative hospital stay was less than 24 hrs in 89.3% and more than 24 hours in 10.7%. The post operative hospital stay was less than 24 hrs in 6.7%, 1 to 2 days in 48.7% and more than 3 days in (44.6%). General anaesthesia was used in 71.3%, while 28.7% were operated under spinal anaesthesia. Registrars operated on 62% while consultants operated on 38% of patients. Interrupted wound closure was used in 69.9%, while subcuticular wound closure was used in (26.7%). Vicryle suture material was used in 41.7%, nylon in 54% and silk in 4.3%. Drains were used in 43% of cases, urinary catheters were introduced in 3.6% and diathermy was used in 78.3% of cases. Blood transfusion during surgery was given in 17.3% of patients.

The overall surgical wound infection rate was 8%. The pre-discharge rate was (0.6%), while post-discharge rate was (7.2%). In clean surgery, the pre-discharge SSI rate was (0.4%), while the post-discharge rate was (6.6%). Clean contaminated surgery had a pre-discharge SSI rate of 1.7% and a post-discharge SSI rate of 10.3%.

At day 10 post-operative, 1.3% of patients developed minor wound infection. At day 14 minor wound infections increased to 3.3% while another 1.3% developed moderate wound infections and 2% developed severe infections. By day 30 post operative, 1% had minor infections with no moderate or severe wound infections.

Table 5 shows that the least SSI occurred with single dose prophylaxis.

Table 5: Relation between type of surgery, SSI and different antibiotic regimen

Surgery	Antibiotic		
	Single pre operative dose	24 hours course + oral	More than 1 day of IV antibiotic + oral
hernia (n=111) Total SSI n=6 (mi) (5.4%)	N=48 (43.3%) SSI (n=0)	N= 36 (32.4%) SSI(n=0)	N=27 (24.3%) SSI (N=6)22.2% (mi)
thyroid (n=94) Total SSI n=9 (9.6%) (6 mi + 3 md)	46 (48.9%) SSI(n=1)2.2%	16 (17.1%) SSI(n=3)18.7%	32 (34.0%) SSI(n=5)15.6%
breast (n=37) SSI n=4 (10.8%) 2 mi + 2 md	19 (51.4%) SSI(n=1)5.2%	0	18 (48.6%) SSI(n=3)16.6%
gallbladder (n=58) SSI n=5 (8.5%) 2 mi, 2 md, 1 sv	11 (18.9%) SSI(n=0)	10 (17.3%) SSI(n =3)30%	37 (63.8%) SSI(n=2)5.4%
Total 300 Total SSI = 24 (8%)	124 (40) SSI n=2 (1.6%)	62 (22%) SSI n=6 (9.6%)	114 (38%) SSI n=16 (14%)

mi = mild md = moderate sv = severe

Table 6 shows the different regimen used by the 5 surgical units.

Table 6: Different unit usage antibiotic

UNIT	Antibiotic			SSI
	single pre operative dose	24 hours IV course + oral	more than 1 day of IV antibiotic + oral	
A (n=63)	n=12 (19.1%)	n=12 (19.1%)	n=39 (61.8%)	N=12 19.1%
B (n=43)	n=9 (20.9%)	n=15 (34.9%)	n=19 (44.2%)	N=6 13.9%
C (n=59)	n=15 (25.4%)	n=21 (35.6%)	n=23 (39%)	N=1 1.6%
D (n=80)	n=65 (81.3%)	n=6 (7.5%)	n=9 (11.2%)	N=3 3.7%
E (n=55)	n=23 (41.8%)	n=8 (14.5%)	n=24 (43.7%)	N=2 2.6%
Total (300)	n=124 (40%)	n=62 (22%)	n=114 (38%)	N=24 8%

P value < .001

Single prophylactic dose was used in 40% of cases. The other two regimens were followed by oral use of antibiotics for an average of 5 days with more SSI rate.

It was found that 23.8% of the patients practised self medication of antibiotics after

being discharged from hospital. The overall SSI was 5.5%, (n=6) in hernia operation (all of minor grade) while in thyroidectomy the SSI was 9.6% (n=9). There were 4 cases of SSI in breast surgery (10.8%) and 8.5% in cholecystectomy. Table 6 shows the great variation in SSI in the 5 surgical units in KTH ranging between 1.6% and 26.4% and in the regimens adopted with a single dose prophylaxis used in 19.1% of patients in unit (A) versus 80% of patients in unit (D). Diarrhoea developed in 3.7%; while 4.3% developed canulae line sepsis.

Various risk factors leading to SSI were studied and were found to have no significant effect. Those were: age, sex, marital status, type of anaesthesia, level of the operator, order of the operation, types of suture material used, use of drains, duration of hospital stay. The relationship of SSI with wound haematoma, nutritional status and self medication was found to be statistically significant (p< 0.05).

Discussion

The total SSI rate in this study was (8%) (n=24). This was distributed as follows, 5.4% in hernia repair, 9.6% in thyroidectomy, 10.8% in mastectomy, and 8.6 % after open cholecystectomy. Eltahawy et al⁽⁵⁾, in a prospective study with 28 days postoperative follow-up, reported 9% total wound infection rate, being 9.5% after clean surgery, 10% after cholecystectomy, 7% after hernia repair and 2% after thyroidectomy. Miguel et al⁽⁶⁾, with 1 month follow, reported a total wound infection rate of 12.4%. In another prospective study, with 30 days follow up, total infection rate of 12.6% was reported in clean wounds⁽⁷⁾. The significant variation of wound infection rate between different surgical units in our study ranging between {1.6%} to {19.1%} may be due to different intra-operative techniques and post operative care in different units. Wound infection rate may differ between individual surgeons, this is supported by prospective study which reported that infection rate varied from 2.9% to 20.0% between individual surgeons in clean operations alone⁽⁸⁾. Furthermore Simchen et al reported inter-hospital wound infection rates variation between (6.3%) and (12.4%)⁽⁹⁾. This variation signify the need for extra supervision and training of junior staff so as to standardize pre-operative, intra –operative and post operative care .

When comparing wound infection rates between different institutions we should be careful because a major problem in calculating the SSI rate is wound definition and grading⁽³⁾. It is clear that SSI rate may be influenced by the method used for wound definition and scoring. In the concept of wound definition and grading there was many conflicting data and there is absence of agreement about which is better and more reproductive. In our study, we used the ASEPSIS score. This scoring system had no subjective element, allow for multiple

observers to be involved and allow grading which would had been difficult if we did not use this numerical score^(3,10,11). Patients scoring more than 20 points, are included as SSI⁽¹¹⁾. This sub group of patients usually had purulent discharge that required some stitches to be removed, antibiotic to be prescribed and resulted in patients requiring regular dressing and more visits to the referred clinic. Lesser scores (<20) usually had no change in management plan, those patients had disturbance of healing which may not be infectious in origin but rather technical.

Usually between 20% to 70% of postoperative SSIs do not become apparent until after the patient's discharge⁽¹²⁾. The pre-discharge surgical wound infection rate was 0.6% being 0.4% in clean surgery and 1.7% in clean contaminated surgery, while the post discharge SSI rate was 7.4% being 6.6% in clean and 10.3% in clean contaminated⁽⁶⁾. In a prospective cohort study, with one month follow up, some authors reported a 5.3% pre discharge wound infection rate (4.6% in clean surgery and 7.7% in clean-contaminated) , and a 7.1% post discharge rate (7.2% for clean surgery and 7% for clean contaminated)⁽⁶⁾. Moreover a prospective study, with 30 days postoperative follow up, reported 4.5% inpatient wound infection rate and 8.1% outpatient wound infection rate⁽⁷⁾. Infections arising post discharge usually originate from sources external to the wound and from cross contamination⁽¹³⁾.

Prophylactic antibiotics are aimed only at preventing wound infections arising from intra-operative contamination with no effect on postoperative and community contamination⁽¹⁴⁾, hence antibiotic prophylaxis will not have an effect on the post discharge rate.

In this study, the wound infection rate in non mesh hernia repairs was 5.4%. Sanchez et al, in a review comparing antibiotic versus no antibiotic in hernia repair, reported wound

infection rates of 3.5% and 4.9% in the prophylaxis and control groups, respectively⁽¹⁵⁾. Furthermore, the reported rates for wound infection in hernia repairs varies from 0.1% to 10%^(16,17,18,19,20). Problems when analysing hernia-related infection rates include differences in study design, surveillance methods, definition of wound infection, duration of follow-up, type of operation, and number and experience of surgeons and centres. It is clear that our wound infection rate did not differ from the data in the above mentioned studies when ASEPSIS score was used and wound infection was defined as having 20 points or more with patients followed for a period of 30 days. All reported infections are minor with no moderate or severe infection. Antibiotic prophylaxis for hernia repair is currently a controversial issue given the disparity among study results in this area. A prospective study, comparing wound infection rates in patients undergoing inguinal hernia repair, reported no significant difference between prophylactic antibiotics at induction and placebo⁽²¹⁾. Furthermore the same conclusion was reported by a Cochrane systemic review⁽²²⁾, and two more studies^(16,23). In our study, the most common regimen used in hernia repairs was single preoperative dose at induction but all regimens were tried with no resultant decrease of wound infection rate. This confirms the fact that sound surgical practise is far important in infection control than antibiotics, and adding doses will only add to the cost.

The wound infection rate after mastectomy was 10.8%, distributed evenly between minor and moderate infections, while there was no reported infections post lumpectomy. Rotstein et al reported 19.0% post mastectomy wound infection and 6.6% post lumpectomy⁽²²⁾. However the reported rates after breast surgery varies between 5% and 30%^(24,25). The high wound infection rate after mastectomy, may be explained by the fact that

all mastectomy patients included in this study underwent modified radical mastectomy for malignancy. In this study, most patients who had mastectomy received IV antibiotics for more than a day and most patients who underwent lumpectomy received single preoperative dose. Talar Tejirian⁽²⁶⁾, in a systematic review of five trials, reported statistically significant advantage of antibiotics prophylaxis in breast surgery and supported the use of single dose preoperatively.

In our study, the wound infection rate after cholecystectomy was 8.5%. Boelhouwer et al reported 13.5% infection rate following open cholecystectomy, (minor infections in 8.3% and major infection in 5.2%)⁽²⁷⁾. Another study reported 14.4% wound infection rate post-cholecystectomy⁽²⁸⁾. In a randomized controlled trial SSI was 4.6% in patient receiving multiple dose prophylaxis compared with 3.8% in those receiving a single dose prophylaxis⁽²⁹⁾. Our patients who had cholecystectomy received prophylactic intravenous antibiotic for more than one day. A randomized controlled trial, comparing single pre-operative dose against multiple doses of the same drug, reported no advantage in preventing postoperative wound infections⁽³⁰⁾.

The reported SSI after thyroidectomy ranged between 0.3% and 2%^(31,32,33). In this study, most of the SSI were minor and the three patients who had severe infection had a tracheostomy following surgery, which is reported to have increased risk of infection⁽³³⁾. There was a great variation in antibiotic prescription practise between the different units for different types of surgery. Single preoperative dose was the commonest regimen used for clean operations while more than 1 day IV antibiotics were the commonest in cholecystectomy. The different surgical units used different regimen for different types of surgery. A study evaluating adherence of surgeons to written guidelines for

antimicrobial prophylaxis in inguinal hernia repair and cholecystectomy, reported that, although only 78.5% of procedures required prophylaxis, it was administered in 97.5% and only 36.3% had optimal duration of prophylaxis⁽³⁴⁾. Another cross-sectional study, including patients who had cholecystectomy and inguinal hernia repair, reported that only 41% used single-dose prophylaxis. There was inappropriately prolonged usage in 52% and 31% of patients who had cholecystectomy and inguinal hernia repair respectively^(6,35). Evidence based data advises no antibiotic prophylaxis in hernia repair^(36,37), thyroid operations⁽³⁸⁾, single preoperative dose in breast^(37,39,40) and cholecystectomy^(41,42,43). According to the above data, in our study, antibiotic prescription was inappropriate in all hernia repair^(16,23,35) and thyroid surgery⁽³⁵⁾, inappropriate in 48.6% of breast operation and 81.1% of cholecystectomy. Although the current evidence fails to support longer duration of prophylactic antibiotic, prolonged administration beyond 24 hrs is common⁽³⁶⁾. There is a major misconception among surgeons about the need for prolonged administration of antimicrobial prophylaxis⁽³⁷⁾. Barie stated that: 'even though we have strong data, nothing seems to have changed. We cannot get surgeons to give up their post-operative prophylactic antibiotics'⁽³⁸⁾. This variation maybe due to the fact that surgeons were accustomed to following their 'own guidelines' as they had been trained and surgeons were afraid of SSIs so they used longer courses of antibiotics as they falsely believed that keeping antibiotics in the bloodstream of a post-operative patient was a good precaution against infection. Also the lack of awareness, lack of agreement by surgeons with the local hospital guidelines, and environmental factors, such as constraints in the surgical suite and in the ward and above all the absence of guidelines.

In our study, there was a significant difference in wound infection rate between different regimens ($p < .001$), with single pre operative dose associated with the lower SSI rate (1.6%). This fact was also true when analysing each type of surgery alone. A systematic review, comparing single versus multiple-dose antimicrobial prophylaxis for major surgery, recommended the use of single-dose antimicrobial prophylaxis for major surgery, and reported no statistically significant differences associated with the type of antimicrobial agent used, length of the multiple-dose arm or type of surgery⁽³⁹⁾. This is supported by numerous clinical studies⁽⁴²⁾. Thus, adding more doses of antibiotic prophylaxis will not decrease infection rate and single preoperative dose is sound from clinical and financial standpoint.

Wound infections are usually diagnosed between day 7 and 21⁽⁴²⁾. In this study, it was found that minor infection started to appear from day 10 reaching maximum at day 14 in which moderate and severe wound infection start to appear.

Many risk factors for wound infection were identified over the years like diabetes mellitus, malnutrition, obesity, ASA score, surgical technique, pre and postoperative stay, haematoma and surgical drains. In this study, postoperative haematoma was found to be significantly associated with wound infection as reported by other authors⁽⁴²⁾.

WHO prohibit dispensing of antimicrobials without the prescription of a qualified healthcare professional because this will lead to inappropriate usage and may drive antibiotic resistance. In this study, the prevalence of self-medication was 23,6% which is high in relation to 3% in Denmark⁽⁴³⁾. This is due to the ease of access to antibiotics, over the counter buying, absence of the prescribed-only policy and patient education. Furthermore the relation between SSI and self medication was statistically significant $p = \{0.001\}$, this demonstrate that patients tend

to self-medicate themselves when their wounds are not satisfactory to them. This point should be emphasized and patients should be told when to come for follow up.

Regarding complication of antibiotic usage, in this study it was found that single preoperative dose and 1 day IV antibiotic was not associated with complications while other regimens were significantly associated with canulae sepsis and diarrhoea. In an epidemiological study of *C. difficile* colitis, surgical antibiotic prophylaxis is the single most common cause⁽⁴⁴⁾, although even single dose prophylaxis increases the risk of carriage of *C. Difficile*.

In conclusion, the overall SSI rate is within

the published data with significant interdepartmental variation. In absence of clear guidelines, there is a tendency for over prescription lasting in the majority to 5 days with high post discharge self medication of 23%. The single dose IV prophylaxis is having the least SSI confirming that the prolonged use of antibiotics conferred no extra protection. There is an urgent need for a hospital antibiotic policy and guidelines for surgical prophylaxis. An infection monitoring body should be established and regular reporting and bacteriological back up is essential to modify future practice. However adherence to aseptic technique will be the basic concept to combat postoperative SSI.

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Differences in prescription of sedative and analgesics in ICU practice in Sudan

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مستخلص الدراسة

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توجد لدينا القليل من الدراسات والمعلومات عن طرق الممارسة فى مجال طب العناية المكثفة فى ما يختص بوصف العقاقير المهدئة والمزيلة للآلم وإجراء مثل هذه الدراسات قد تساعد فى الوصول الى اتفاق بين الممارسين لطب العناية المكثفة لوضع ضوابط وبروتوكولات تنظم إستخدام هذه القاقير. الهدف من الدراسة:

تهدف هذه الدراسة لمعرفة التطبيق بالعقاقير المهدئة والمزيلة للآلم للمرضى فى حالة حرجه بالعناية المكثفة بصورة منتظمة ومعرفة نوعية هذه العقاقير وهل هنالك معايير واضحة لوصف هذه العقاقير وهل هنالك نظام تقييمى مستعمل لتحديد مستوى التهئة للمرضى بالعناية المكثفة. طريقة إجراء الدراسة:

قمنا بتقييم الفرق فى التطبيق ووصف العقاقير المهدئة والمزيلة للآلم للمرضى بوحدات العناية المكثفة بولاية الخرطوم والى يمكن ان تعتبر مثال حقيقى لخدمة العناية المكثفة فى كل القطر السودانى وذلك بواسطة إستبيان موجة لكل الأخصائين العاملين فى مجال العناية المكثفة (40 أخصائى).

النتائج:

نسبه بسيطة (27%) من الأطباء قيد البحث (40 أخصائى) يستعملون العقاقير المهدئة بصورة منتظمة لكل المرضى تحت التنفس الصناعى مما يعنى بأن هنالك فة معتبره من هؤلاء المرضى تعانى من الآثار الجانبية الضارة لعدم إستعمال هذه العقاقير. عمار الميذازولام هو أكثر العقاقير المهدئة وصفاً بواسطة أخصائى العناية المكثفة قيد البحث، مع نسب متفاوتة ليقية العقاقير والمتمثلة فى البروبوفول، الكتمين والثيوبنتون. عدد كبير من إختصاصى العناية المكثفة (40%) لا يستعمل نظم التقييم المعمول بها عالمياً لتحديد مستوى التهئة لمرضى العناية المكثفة مما قد ينتج عنه زيادة او نقصان فى مستوى التهئة المطلوبه وكلّ لديه الكثير من الآثار الجانبية الضاره. وجدت الدراسة بأن عمار البثدين من أكثر العقاقير المزيلة للآلم وصفاً بواسطة إختصاصى العناية بالرغم من أعراضه الجانبية المتعدده.

الخلاصة:

أظهرت الدراسة بأن هنالك الكثير من الفروقات الجوهرية فى ممارسة التطبيق بالمهدئات ومزيلات الآلم بين الوحدات المختلفة للعناية المكثفة وقد خلصت الدراسة الى ان هذه الممارسة تحتاج لمزيد من التقييم ووضع الضوابط والاستراتيجيات الواضحة فى مجال التطبيق بهذه العقاقير فى وحدات العناية المكثفة بالبلاد.

Abstract

Relatively little information is available on common sedative and analgesic practice in Sudanese ICUs. Exposing the situation will help to reach a consensus towards establishment of protocols regarding the use of sedatives and analgesics in ICU.

Objectives

The aims of this observational exploratory study is to know whether sedatives and

analgesics are administered regularly to critically ill patient in ICU, to determine the commonly used sedative and analgesics, to identify strategies for sedatives and analgesics administration and to identify whether sedation scoring systems are used.

Methods

In this observational exploratory study we sought to assess the differences in the prescription of sedative and analgesic drugs in Khartoum state's ICUs, as an example of ICU practice in Sudan, by means of a short, self-administered questionnaire. All intensive care physicians in Khartoum state (40 physicians) were targeted by the questionnaire.

Results

The study approached 40 ICU physicians using short questionnaire. Among the respondents of this study, only 27% use

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sedation in 100% of their mechanically ventilated patient, with a large percentage of patients at risk of developing adverse events from lack of sedation. The most commonly used sedative is midazolam; propofol used by most of physician, and ketamine and thiopentone used in small percentage of patients. Large percent of ICU physicians never use sedation score (40%), with the risk of over or under sedation. Concerning ICU analgesia, pethidine is the most commonly used analgesic drug (37.5% used it always).

Conclusion

The study demonstrated substantial differences in sedative and analgesic practices in Sudanese ICUs. The study concluded that our practice regarding sedation and analgesia is in need of further evaluation and it should be guided by protocols and strategies that control drug administration.

Keywords: anaesthesia, analgesia, pain

Introduction

Sedation is a universal requirement for all patients in intensive care units (ICU). Sedation is required to relieve discomfort and anxiety caused by procedures such as tracheal intubation, mechanical ventilation, suction and physiotherapy. Analgesia is also required for ICU patients.

The use of sedative medications can have substantial impact on the duration of ICU length of stay and complications, a fact that raised the awareness of the value of structured sedation evaluation. Reliable sedation tools can improve consistency in drug administration, be used in sedation protocols and improve precision of medication titration as patient needs change over time. The routine use of a sedation scale, with frequent adjustment of the sedation target as needed, is strongly endorsed in recent guideline. Unfortunately, sedation scales are underused in ICUs.

Pain is a common experience for most ICU patients. Failure to recognize that frequently leads to agitation and may result in excessive administration of sedatives. Accordingly, an

aggressive approach to managing pain has been strongly recommended by published consensus opinions. Surgical incisions, indwelling vascular catheters, endotracheal suctioning, and mechanical ventilation are all potential sources of pain for patients in ICU. Pain may result in many adverse events including increased endogenous catecholamine activity, myocardial ischemia, hyper metabolic states and anxiety. Oxygen consumption can be reduced from baseline by an average of 15% after administration of sedatives and opioids in mechanically ventilated patients.

Variations in sedative and analgesic drugs prescription, the most commonly used types and the use of sedation scales were assessed in this study, so that guidelines can be adopted and the existing strategies of drug administration evaluated.

Methodology

This is an observational exploratory study conducted among Sudanese ICU physicians to identify differences in prescribing sedatives and analgesics.

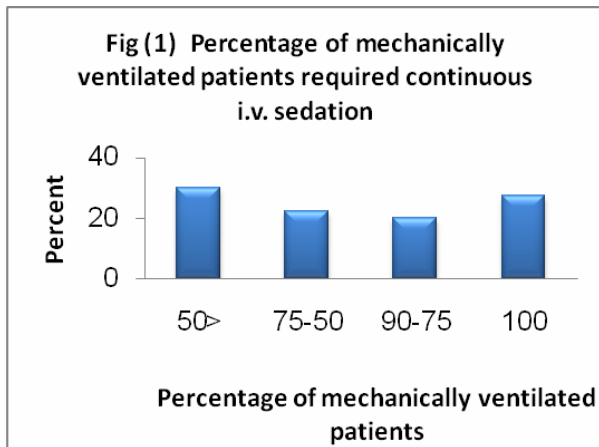
The approval for the study was obtained from the ethical committee.

The study was conducted in Khartoum state, the capital of Sudan, as most ICUs in Sudan are in Khartoum state where the ICU practice is considered as a representative to the ICU practice in Sudan. The study was conducted in the period from November 2009 to June 2010. A short questionnaire was handed directly or sent by e-mail to all ICU physicians in Khartoum state. The short questionnaire asked seven questions regarding the clinical use of sedative and analgesic drugs. The answers were then collected on a computer database. Data were then tested for descriptive statistics (using frequencies and percentages).

Results

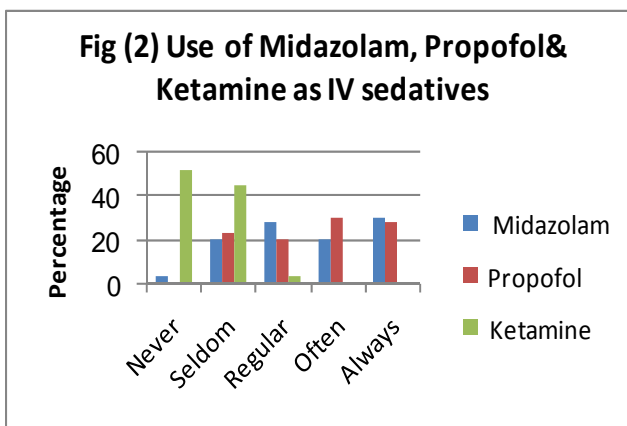
The use of sedation for mechanically ventilated patients varied considerably between ICU practitioner in Sudan. Those who think less than 50% of ventilated patients need continuous sedation being 30%, those

who think 50%-75% need sedation were 22.5%, those who think 75-90% need sedation were 20%, and those who think 100% of mechanically ventilated patients need sedation were only 27% (Fig 1).

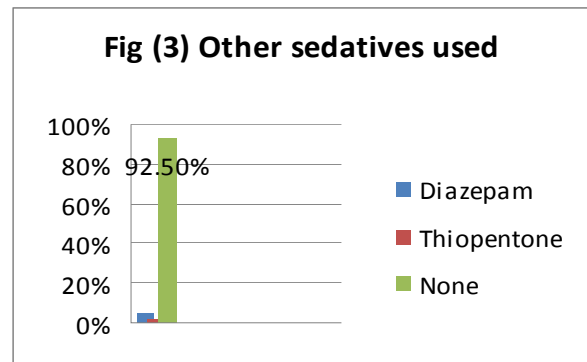


Regarding the selection of drugs used in patients requiring a continuous infusion of sedation, midazolam is always used by 30% of respondents, 20% use it often, 27.5% use it regularly, 20% seldom and 2.5% never use midazolam (Fig 2).

Propofol is always used in 27.5% of patients requiring a continuous infusion of sedative agents, often used in 30%, regularly used in 20% and seldom in 22.5% (Fig 2).

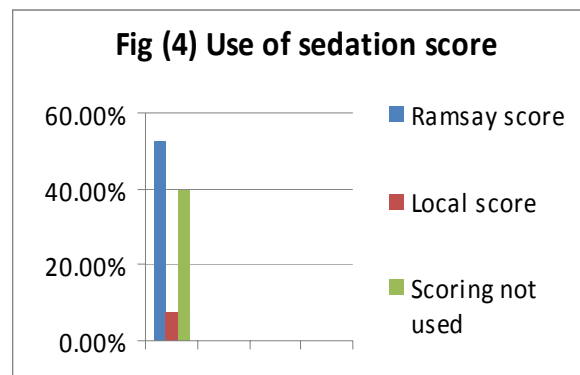


Other sedative used were diazepam, by 5% of the respondents, and thiopentone by 2.5% (Fig 3).

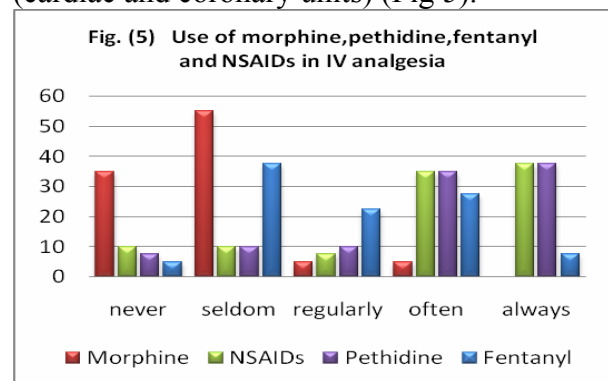


The percentage of the respondents who used to use ketamine regularly in patients needing sedation is 2.5%, 45% using it seldom and 52.5% never used it (Fig 2).

Concerning the use of sedation score, 40% of the respondents do not use sedation scoring system, 52.5% of those using sedation scoring system use Ramsay score sedation system and 7.5% use local score (Fig 4).



Regarding the use of analgesics in ICU, 35% of the respondents never use morphine, 55% use it seldom, 5% regularly and 5% often (cardiac and coronary units) (Fig 5).

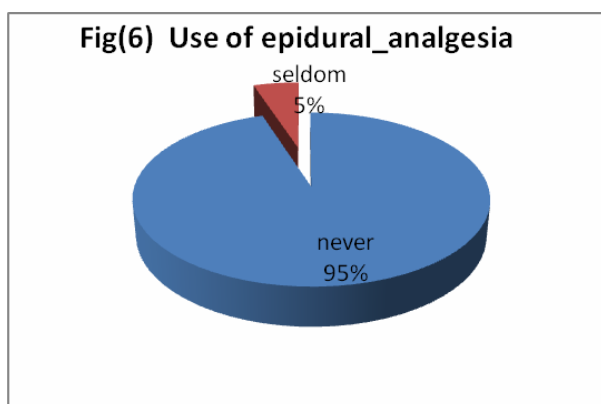


Fentanyl is always used for intravenous analgesia in ICU by 7.5% of the respondents, often by 27.5%, regularly by 22.5%, seldom by 37.5% and 5% never use fentanyl (Fig 5).

The percentage of the respondents who always use pethidine for intravenous analgesia in ICU is 37.5%, 35% use it often, 10% regularly, 10% seldom and 7.5% never use pethidine (Fig 5).

Concerning the use other form of analgesia, non-steroidal anti-inflammatory drugs (NSAIDs) is always used as ICU analgesia by 37.5% of the respondents, 35% use it often, 7.5% regularly, 10% seldom and 10% never used NSAIDs (Fig 5).

Ninety five percent of the respondents have never used epidural as ICU analgesia and only 5% use it seldom (Fig 6).



Concerning other forms of analgesia, local infiltration is used by 10% of the respondents, interpleural block by 10%, paracetamol by 10%, tramadol by 60% and nopain by 10% (Table 1).

Table 1: Other forms of analgesia

	Frequency	Percent
Interpleural block	1	10
Local infiltration	1	10
Paracetamol	1	10
Tramadol	6	60
Nopain	1	10
Total	10	100

Discussion

Virtually every patient admitted to the intensive care unit should be administered

sedation therapy⁽¹⁾; this is applicable, with variable levels, to all patients in ICU, whether mechanically ventilated or not.

A minority of ICU physicians in this study (only 27%) believe that all (100%) mechanically ventilated patients should receive a continuous intravenous sedation, while the majority (30%) think that only less than 50% of mechanically ventilated patients need sedation, disregarding the fact that the desired result of a sedation regimen is to allow the patient to tolerate the physical environment, and the unpleasant procedures and therapies that are necessary in the ICU, to facilitate nursing care and management, and reduce both anxiety and stress, so that post-traumatic stress disorder does not occur after discharge from the unit⁽²⁾. The blunting of autonomic responses, reduced oxygen consumption and ventilator synchrony are other important goals of sedation therapy⁽³⁻⁷⁾. An agitated patient on mechanical ventilation is really a major challenge for ICU physician; this may result from many specific correctable causes that should be addressed first, but still patient agitation requires sedation to control. The increased morbidity and mortality and poor outcome among our ICU patients is directly related to this practice. Highlighting the importance of sedation for ICU patients and evaluation of existing strategies is extremely recommended. In this study, the most commonly used sedatives for mechanically ventilated patients (in those who believe in that) are midazolam and propofol, being always used by 30% and 27% of respondents respectively. Although the use of midazolam is more common than propofol, a combination of drugs strategy is accepted and practiced by all ICU physicians who believe in the use of sedatives for mechanically ventilated patients. No single drug can achieve all the indications for sedation and analgesia in the ICU, a combination of drugs, each titrated to specific end points, is typically a more effective strategy⁽⁸⁾.

Benzodiazepines are particularly useful because they are anxiolytic, anticonvulsant, amnesic and provide some muscle relaxation in addition to their hypnotic effect⁽⁹⁻¹¹⁾. The common drugs used in this class are diazepam, midazolam and lorazepam. Midazolam is the most commonly used drug in this group as it is less irritating at the injection site and as it has got a short elimination half life of 2 hours. Diazepam use has decreased because of concern about its active metabolites (especially desmethyl diazepam) which has a long half life. 2.5% of the respondents of this study stated that they never use midazolam for ICU sedation. Diazepam is used by a low percentage (2%) of the respondents of this study. Lorazepam is not used for sedation in ICU in Sudan.

Although propofol has a rapid onset and offset of action because it is metabolized rapidly, both hepatically and extrahepatically, and is ideal for continuous infusion, only 27% of participants involved in this study use it always and 22.5% seldom use propofol as an ICU sedative.

In subanaesthetic doses ketamine is sedative and also analgesic. However, it is generally not used because of the rise in blood pressure, ICP and pulse rate that may result. It is a cheap form of analgesia that can be used in poor countries if not contraindicated; it is particularly useful in asthmatics and cardiovascular stable patients. Although ketamine is a useful sedative and analgesic, but with side effects, only 2.5% of the respondents of this study use ketamine regularly.

Thiopentone was used as an ICU sedative by only one physician (2.5%) for cases with raised intracranial pressure and in intractable seizure activity. Its use as a sedative is not popular among ICU physicians as it causes significant cardiovascular depression and accumulates during infusions leading to prolonged recovery times. Drugs like butyrophenones and phenothiazines,

clonidine, chlormethiazole and chloral hydrate are not used for ICU sedation in Sudan.

In order to prevent the adverse complications of poorly controlled sedation, sedation therapy should be administered in a careful and precise manner; and to be able to reach this goal the routine use of sedation scales is essential. The scoring system selected for use must be easily understood, used routinely and be part of the regular assessment of the ICU patient⁽¹²⁾. Regarding the use of sedation scoring system for sedated patients in ICU, 52.5% of the respondents use Ramsay sedation score, 40% do not use any scoring system to assess sedation while 7.5% use a local score which is non specific, depending on clinical and haemodynamic variables that can be altered by many common pathologies in the critically ill patients. It is obvious that a high percentage of ICU patient in Sudan (47.5%) are either receiving uncontrolled sedation or no sedation, with its attendant risks.

Regarding use of intravenous analgesics in ICU, 5% of the respondents regularly use morphine as an ICU analgesic, 5% use it often (especially in cardiac and coronary care units), 55% use it seldom and 35% never use morphine for ICU analgesia. Although some newer agents, having specific advantages, have been introduced, morphine, which is the most commonly used analgesic in the literature and the drug against which all other opioids are being measured, is under used by ICU physicians in Sudan. Of the new analgesics, fentanyl is used often as continuous intravenous analgesia by 27.5% of the respondents, 22.5% use it regularly, 37.5% use it seldom, 7.5% use it always and 5% never use fentanyl. Although used more than morphine for ICU analgesia, there is always a shortage of supply, depending on hospitals and central medical supplies policies; a reason why fentanyl being underused or even not used by most of ICU physicians in Sudan.

Pethidine is the most commonly prescribed opioid in Sudanese ICU practice, as it is the cheapest and always available, despite its low potency, short duration of action, and unique toxicity (i.e., seizures, delirium, other neuropsychological effects) relative to other available opioid analgesics. Nevertheless, some physicians continue to use it as the first line opioid. The percentage of the respondents who use pethidine always as intravenous analgesia in ICU is 37.5%; 35% use it often, 10% use it regularly, another 10% use it seldom and 7.5% of the respondents never use pethidine as an ICU analgesia.

Being available, cheap and simple to use, NSAIDs are always used by 37.5% of the respondents while 35% use it often.

Only 5% of the respondents are familiar with epidural and used it as one form of ICU analgesia in specific cases (postoperative analgesia), probably as a result of the skills needed, availability of epidural kits and lack of training.

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Case Report

Blepharophimosis syndrome in a Nigerian male child

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التصاق الجفوف عند طفل ذكر من نيجريا .

أموليس س و
أموليد ب و
ماجكودوغى م ب
أموليس ب و

هذه حالة طفل يبلغ من العمر ستة سنوات يعانى من التصاق الجفون تسبب فى ضعف فى النظر .

ليس هنالك حالة مشابهة فى الاسره كان مقياس النظر فى العين اليمنى واليسرى هو 6/18 و 6/18-1 ويعانى الطفل أيضاً من ثلل عضلات السليارى وتوسع العين واستقامتزم.

نوصى بأجراء عملية جراحية تجميلية لهذه الحالة

Abstract

This report is a case of blepharophimosis syndrome in a six-year-old Nigerian male child who presented to the Eye clinic of Federal Medical Centre, Owo in June 2010 on account of poor vision of one-year duration. There was no history of similar occurrence in the family of the patient. The patient's vision was 6/18 and 6/18-1 in the right and left eyes respectively. The patient had cycloplegic refraction which revealed hyperopic astigmatism, but the vision did not improve with post cycloplegic test that was done due to the amblyopia the patient had.

In view of this and for cosmetic reasons, the patient was encouraged to have ptosis surgery.

Keywords: Blepharophimosis syndrome, amblyopia, male, sporadic, Nigeria.

Introduction

Blepharophimosis syndrome is a congenital eyelid malformation. It was first reported in 1841 by von Ammon⁽¹⁾. It is inherited in an autosomal dominant fashion⁽²⁾. In humans, the upper and lower eyelids normally fuse together in the eight-week of development and separate again between fifth and seventh months⁽³⁾. Abnormal eyelid development has been observed in both mice and humans, but the molecular events governing both normal and abnormal eyelids development are not fully understood^(4,5). However, some progress in understanding the molecular genetic basis of blepharophimosis syndrome has already been made⁽⁶⁾. Blepharophimosis syndrome is associated with dominantly inherited mutation in the FOXL2 gene on chromosome 3q23. The gene is expressed in the development of eyelid and ovary⁽⁷⁾. Up to 75% of patients with blepharophimosis syndrome have relatives who have FOXL2 mutation, the remaining 25% of cases represent new mutation or milder expression in previous generations. Type 1, blepharophimosis

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syndrome is characterised by complete penetrance and transmission through males because of impaired female fertility due to premature ovarian failure. In type 2, there is incomplete penetrance and transmission by both males and females^(4,7,8).

Other chromosomal regions have been implicated in the aetiology of blepharophimosis syndrome. Maw et al reported linkage of blepharophimosis syndrome in large Indian pedigree to chromosome 7p13-p21⁽⁶⁾. Blepharophimosis syndrome features include epicanthus inversus, low nasal bridge and ptosis of the eyelid resulting in narrowing of the palpebral fissures. Associated features of the eye include nystagmus, microphthalmos, microcornea and stenosis of the lateral canaliculi⁽²⁾. Other features of blepharophimosis syndrome include mental retardation seen mainly in sporadic cases⁽²⁾. Refractive errors, amblyopia and strabismus are commonly associated with blepharophimosis syndrome⁽⁹⁾.

It is also often associated with nasolacrimal drainage problems. There was an incidence of 18% of nasolacrimal drainage problems in a previous study⁽¹⁰⁾.

In view of the rarity of blepharophimosis syndrome in this environment, we decided to highlight the case of blepharophimosis syndrome with associated amblyopia in a six-year-old Nigerian male child. We are not aware of similar reports in this part of the world.

Case history

A six-year-old Nigerian male presented to the Eye Clinic of Federal Medical Centre, Owo in June 2010. The patient presented on account of not seeing the chalk board very well of one year duration and history of discharge of one week duration. The discharge was associated with redness of both eyes and itching. There is no history of trauma to the eyes and no history of use of recommended glasses. There is no family history of drooping of the lids.

On examination, the visual acuity was 6/18 on

the right and 6/18-1 on the left. There was no improvement in visual acuity with pin hole. The patient had bilateral ptosis. Evaluation of the ptosis revealed palpebral fissure height of 6mm on the right and 7mm on the left. The lid excursion was 6mm in both eyes. The margin reflex distance(MRD) was zero. The patient also had bilateral epicanthus inversus and telecanthus (Fig 1).

Fig1: Blepharophimosis syndrome (showing telecanthus, bilateral symmetrical ptosis and epicanthus inversus)



There was mild discharge from both eyes and hyperaemia of the conjunctiva of both eyes. The remaining structures in the anterior segment were normal. Funduscopy examination revealed pink optic disc with a cup-disc ratio of 0.3 with normal vessels in both eyes. An assessment of blepharophimosis syndrome was made. Cycloplegic refraction was done two weeks later following resolution of the hyperaemia in both eyes and the patient was discovered to have mild hyperopic astigmatism. The post cycloplegic test done did not result in any appreciable improvement in visual acuity, thus recommended, glasses was not prescribed. The patient was to be referred to an Oculo-plastic surgeon for ptosis surgery. However, the grand mother declined in view of the fact that she did not see the need for surgical intervention. We counseled the grand mother on the need for her to allow the child to have ptosis surgery, but she was yet to accept at the time of this report. In view of this, we decided to review the child periodically and we intend to use the opportunity to encourage the maternal grand mother as well as the parents of the child to consent to surgical intervention most especially in view of the fact that the child had developed amblyopia. The periodic review

would also enable us to detect any nasolacrimal drainage problem in the child.

Discussion

The late presentation of this patient could have led to stimulus deprivation amblyopia. There have been previous reports of amblyopia associated with blepharophimosis syndrome. A study by Jethani et al in India reported that 31.5% of their patients with blepharophimosis syndrome had amblyopia⁽⁹⁾. In case series report by Beckingsale et al, 39% of the 28 patients with blepharophimosis syndrome had amblyopia⁽¹⁰⁾. The authors concluded that patients with blepharophimosis syndrome have a high rate of amblyopia⁽¹⁰⁾. In a case series of one hundred and one of blepharophimosis syndrome reviewed by Beaconsfield et al in London, 56.4% of them had amblyopia⁽¹¹⁾. It has been advocated that patients with severe ptosis should have their ptosis corrected before three years of age and all other patients should undergo surgery before five years of age⁽¹⁰⁾. It is a pity that the case highlighted presented late and his maternal grandmother was yet to consent to ptosis surgery as at the time of this report. It is however, to the advantage of the patient that he did not have co-existing strabismus which could have doubled the risk of amblyopia in him.

Blepharophimosis syndrome is often bilateral and symmetrical. The patients usually have smaller than normal eyelid opening. There was however a report of unilateral blepharophimosis syndrome in China by Cai et al⁽²⁾. Blepharophimosis syndrome is often

associated with nasolacrimal drainage problems. This association is one of the reasons why we encouraged this patient to come for review periodically. Athapilly et al reported congenital alacima in a patient with blepharophimosis syndrome⁽¹²⁾.

The severity of ptosis in blepharophimosis syndrome may make children to adopt a chin-up, backwards head-tilt position and to recruit the frontalis in elevating the lids leading to raised arched eye brows. However, the later findings were not observed in our patient in spite of the severity of the bilateral ptosis. We suspect that the case highlighted is likely to be sporadic in view of the fact that we could not establish family history. It is interesting to note that our patient was said to be performing well in primary school. This is noteworthy considering the fact that blepharophimosis syndrome most especially the sporadic type is associated with mental retardation. Cai et al in China reported a novel case of unilateral blepharophimosis syndrome and mental retardation associated with de novo trisomy for chromosome 3q⁽²⁾.

We conclude that early corrective surgery to prevent development of amblyopia in blepharophimosis syndrome is advised. This explains our decision to refer the patient for ptosis surgery for cosmetic reasons and to ensure restoration of normal visual development in the child.

Acknowledgement

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Short Communication

Educational technology in surgery

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إستخدام التكنولوجيا التعليمية في الجراحة

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أحمد حسن فحل

التدريب الجراحي هو عملية معقدة جداً لما يحتويه من تطور الإدراك وكذلك المهارات الإكلينيكية والجراحية لدى الطبيب و مع الزيادة السريعة والنمو المطرد لأنواع العمليات الجراحية المختلفة، يحتاج الجراح لإستخدام أنماط أكثر فعالية في التعلم الجراحي. التدريب الجراحي واجه العديد من الصعوبات والتحديات فيما يختص بفعاليته، إرتفاع تكاليفه وسلامة وأمان المرضى على مر العصور.. إن التقدم التكنولوجي الظاهر للعيان، مع التغييرات المتصلة في النظام الصحي وإزدياد التركيز على المهارات السريرية والتفكير المقارن، كل ذلك أدى إلى زيادة إستخدام التكنولوجيا في التدريب، التعليم والتقويم في الحقلين الطبي والجراحي. وعلى سبيل المثال تم إستخدام المحاكاة والتدريب المعتمد على الكمبيوتر في حل الكثير من المعضلات التعليمية، الإقتصادية والأخلاقية المتعلقة بعملية التدريب أثناء العمليات الجراحية. كما تم إدخال المرضى الإفتراضيون، طرق التعلم الذاتي، مجموعة النقاش على الويب وكذلك التعلم بإستخدام الإنترنت بصورة موسعة في الكثير من مناهج الجراحة. إن الغرض الأساسي من هذا البحث هو مراجعة نقدية للمعلومات المتوفرة حول أنواع، فوائد ووجوه التقصير في الأنواع المختلفة للمحاكاة والتعلم المعتمد على الكمبيوتر في التعليم والتدريب الجراحي.

Abstract

Surgical training is complex and consists of developing cognitive, clinical and technical skills. As new types of operations are developed rapidly, surgeons find a huge need for more efficient methods of surgical skill training. The training system of surgeons has faced many challenges in terms of time efficiency, costs and patient safety. Advances in technology, changes in health care environment and the increased focus on clinical skills and reasoning have promoted the use of technology as a method of teaching,

learning and assessment in medical and surgical fields. Simulation and computer-based training have been used to solve many of the educational, economic and ethical issues related to the learning process of operations. Virtual patients, virtual reality, self- study and online discussion groups as well as the web-based learning have been incorporated widely in the surgical education curriculum. The aim of this review is to critically examine the published literature to evaluate the types, advantages and limitations of different simulators and computer-based learning methods in surgical education.

Keywords: Technology, surgery, education.

Introduction

The rapid development of technology has dramatically influenced the medical field. Advances in information technology, instrumentation, visualization and monitoring have enormous impact on the ways which diseases are diagnosed and treated. Of greatest importance, is the introduction of computer -

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assisted training and learning in surgical practice, a field of growing demand for continuous training, education and accurate assessment of skills and performance.

Surgical skills are not only needed by specialist surgeons as less complex skills are required by a wide variety of health care practitioners such as students, general practitioners and nurses⁽¹⁾. Expertise in surgical skills cannot be achieved by simply observing the others, sustained deliberate practice is needed. A key challenge for training health care practitioners is to provide conditions for effective learning without putting patients' health at risk. Another challenging task in surgical training is the assessment of the operative proficiency, psychomotor and dexterity skills, visuo-spatial abilities and stress tolerance of health care practitioners⁽²⁾.

The traditional method for surgical training is based upon the preceptor or apprenticeship model, instituted by Dr. William Halsted in the 1890s, in which the learning process occurs through small groups of peers and superiors in the course of patient care. Although it remains the cornerstone of surgical training, in this 'learning by doing' approach the majority of technical skill instructions occur through unstructured operating room exposure with poor constructive feedbacks. Other factors such as duty hour restrictions, random patients flow, patient safety concerns, operating room time and cost as well as ethical considerations, have emerged as drawbacks for this teaching method⁽³⁻⁵⁾. Consequently, laboratories dedicated to teaching technical aspects of surgical skills have emerged. These laboratories were first introduced in 1960s with simple suturing models⁽⁶⁾. Recently, advanced models that allow operative practice and simulate intraoperative complications are used. However, economic and time factors hindered this teaching approach as well as other emerging educational practices such as

case conferences, grand rounds, bedside teaching conferences and problem-based learning⁽⁵⁻⁷⁾. Recognizing these problems, the adoption of simulation and computer – based training was suggested as a next step in surgical education.

Simulation refers to the act of mimicking a real object, event or process by assuming its appearance or outward qualities. Simulators are designed to reproduce some aspect of the working environment. This may vary from the replication of an aspect of a task, e.g. venous cannulation to the recreation of an entire working environment such as the operating theatre⁽⁴⁾. Simulation offers a safe, non-clinical environment designed to meet the educational needs of a range of learners. There are many advantages of using simulation in surgical education. The training agenda can be determined by the needs of the learner, not the patient. It encourages the acquisition of skills through experience, ideally in a realistic situation or environment, and can stimulate reflection on performance. Learners can focus on whole procedures or specific components, practicing them as often as necessary. Simulation frees teachers and learners from the anxieties of being responsible for patient care while teaching. This is especially important during early training^(1,2,8).

Numerous examples of simulators are available that range from low- to high-fidelity, which is the extent to which the appearance and behavior of the simulator / simulation match the appearance and behavior of the simulated system. Simulators can take many forms such as part tasks trainers, simulated patients and computer-based systems and environments. Part task trainers are designed to replicate only part of the environment and used to train basic psychomotor skills, such as cannulation and venepuncture. The simulated patient may be a professional actor trained to present a history and sometimes to mimic physical signs, or a patient who has received training to present his or her history in a

standardized, reliable manner. Computer – based simulators then emerged, and offered a strong educational tool using multimedia programmes, interactive systems, virtual reality and haptic systems⁽⁹⁾.

Computers in surgical training

Computer-based training (CBT) in surgery is different from textbooks or other delivery vehicles that incorporate multimedia content because of its ability to allow interaction with the user. The development of computer programming in medical education has taken many directions. The first category consists of multimedia products that merely duplicate text-book information and paper-based testing process. These non- interactive softwares add little value to the educational process. Other categories of more dynamic softwares include virtual patients, virtual reality computer-based simulation, self-study and online discussion group.

Virtual patients

Virtual patients (VP) are accurately defined as interactive computer simulation of real-life clinical scenarios for the purpose of healthcare and medical training, education and assessment. Other terms for VP may still be used in the literature such as computer simulated cases, computer-based simulated patient and computer based clinical case. VP are typically presented as a set of data that describes a pre-existing case. It aims most often to address particular topics or educational objectives that students work through by taking history and doing physical examination in order to make a diagnosis⁽¹⁰⁾.

Unlike normal patients, which are time and resource expensive, VP have the advantage of providing the student with a standardized experience and access to the most common diseases without the patient being available. They also allow repetitive practice of the skills by any learner in a safe environment for the patient and student. Virtual patients are usually enriched by multimedia technology

using audio, full-motion videos, high resolution images, animation and graphics which helps in the learning process and enhances the interdisciplinary care for the patients⁽¹¹⁾. The VP has the advantage of being easily modified to demonstrate a variety of clinical or interview scenarios. As computer-based VP can be used at any time, they can be integrated into curricula in a flexible manner⁽¹²⁾. Computer – based case simulations were also used in exams to assess the competence of physicians and other health care providers. It was introduced by the United States Medical Licensing Examination (USMLE) to step 3 examinations⁽¹³⁾.

Virtual patients design range from simple web-based to the expensive resource-intensive productions⁽¹⁴⁾. However, two categories of designs are most frequently used when considering designing virtual patients, the problem-solving and the narrative approach. The problem-solving approach is aimed for learning and training clinical reasoning or diagnosis. In such a system, the student gathers information, usually from menus of possible history questions, lab tests, and physical examinations, and subsequently makes diagnostic and management decisions based on their findings. The narrative approach is often found in virtual patient encounters which are concerned with cause and effect. In general 'narrative' designs are more expensive to produce because the narrative has to be individually crafted, rather than created using a template^(11,15,16).

Although computer based patient simulation system meets many educational requirements for students, problems exist during constructions. Virtual patients are expensive to develop, time consuming, may require additional training for faculty and trainees with a need for experienced multimedia developers. On the other hand, VP once developed, are relatively easy and inexpensive to access and distribute⁽¹⁷⁾. In an attempt to

solve these problems the Web – based patient simulation system (Web – SP) was introduced. This project was initiated in 2001, at Karolinska Institute (KI) in Sweden, aiming to develop a new type of virtual patients system that allows users to edit and run cases online^(10,18). There are many advantages of using the web to deliver virtual patients. Cases are directly and always available. They can be accessed anytime and anywhere worldwide from any platform (Windows, Linux, Mac OS). Moreover, Web – SP provides an open environment for efficient collaboration among users and exchange of patient cases⁽¹¹⁾. The Web – SP design targets learning and training through a number of basic elements such as helping students to test their existing knowledge and to identify gaps in their knowledge by discussing cases, looking up texts and references while working at the computer and accessing online resources. Through providing feedback on performance, students get the chance to evaluate their performance against an expert (the case author) and to compare the expert's reasoning (e.g. differential diagnosis, tests performed) to their own (a way of monitoring their own thinking)^(11,17).

A number of programmes have been recently developed which aim to enable importing and exporting virtual patients. One example of these is the eViP (Electronic Virtual Patients), a 3-year programme co-funded by the European Union (EU) to create a bank of purposed and enriched multicultural virtual patients' case from across Europe. The vision of the eViP Programme is to create a shared online bank of virtual patients, adapted for multicultural and multilingual use, for the improved quality and efficiency of medical and healthcare education across the EU⁽¹⁰⁾.

Virtual reality

Virtual reality (VR) is described as a collection of technologies that allow people to interact efficiently with 3 dimensional computerized databases in real time using

their natural sense and skills. Other related terms include artificial reality, cyberspace, and more recently, virtual worlds and virtual environment⁽¹⁹⁾. Virtual reality simulators can duplicate the operative field, enhance training and reduce the need for expensive animal models⁽²⁰⁾. In another role, VR training systems are designed to measure various aspects of performance, such as motion and efficiency characteristics, errors, and time to complete a specified task. Currently, virtual reality is used for surgical training for different operative procedures such as laparoscopic cholecystectomy, endoscopic sinus surgery, lower limb trauma, and vascular and microsurgery anastomoses⁽²¹⁾.

Computer generated surgical simulation, or VR simulators allow learners to practice in an environment free of risk to other trainees or patients. Any particular training module or task performance can be replicated, interrupted and recommenced as many times as necessary. Also, the opportunities are always available for practice without having to wait for an appropriate case with the degree of difficulties adjusted to meet the individual learner's need. Reliable feedback can be provided for the instructor and student with stress levels controlled for optimal learning^(22,23).

A wide range of virtual reality training systems have been developed. It varies from the commercially available simulators for learning basic skills such as venepuncture to more complex simulators for different procedures such as therapeutic gastroscopy, cardiac catheterization or angiography⁽¹⁹⁾. Virtual reality simulators have been applied widely to minimal – access surgical techniques using laparoscopy. Laparoscopic Cholecystectomy was first performed in 1987 by Philip Mouret⁽²⁴⁾, and since then a strong demand for learning this new surgical technique grew with its use for a variety of operations. Laparoscopic surgery has many advantages over the conventional open

surgery because of reduced trauma and less pain, shorter hospitalization, rapid return to normal activity and better cosmetics⁽²⁵⁾. The skills required to perform laparoscopic surgery are different to those of open surgery with a significant learning curve associated with the former and many of the complications occurred secondary to a lack of initial training⁽²⁶⁾.

There are currently large numbers of virtual reality simulators available commercially⁽²⁶⁾. One of these is the Minimally Invasive Surgical Trainer System (MIST-VR), one of the most extensively validated virtual reality simulators. This system, designed by Mentice Corporation of Sweden, is based on 3D computer graphics that accurately track and represent the movement of the instruments within a virtual operating volume⁽²⁷⁾. The MIST-VR can be used for teaching basic psychomotor skills for all forms of minimally invasive surgery and is able to distinguish between various grades of surgeons⁽²⁶⁾. One major limitation in the MIST-VR station is the lack of tactile feedback, which may attenuate the degree of realism afforded by the simulator⁽²⁸⁾. Recent studies have consistently demonstrated that subjects training on MIST-VR achieve better operating room performance than similar subjects who did not receive MIST-VR training^(29,30). Other laparoscopic trainer systems are available such as the LapSim system, The Xitact LS500 laparoscopy simulator, the Reachin Laparoscopic Trainer, the ProMISTM Surgical Simulator and the LapMentor (Symbionix) simulator^(31,32).

Virtual reality has been reported to improve learning outcomes in different surgical procedures. In fact, a recently published systematic review of twenty-three randomised controlled trials on the effectiveness of virtual reality training for laparoscopic surgery found that in trainees without surgical experience, virtual training decreased the time taken to complete a task, increased accuracy and

decreased errors compared with no training. In participants with limited laparoscopic experience, virtual reality training resulted in a greater reduction in operating time, error and unnecessary movements than standard laparoscopic training⁽³³⁾.

Virtual reality simulators have also been applied to microsurgery. Microsurgery is an integral part of all surgical specialties and applied to many surgical techniques using operating microscopes that require higher quality of skills than other aspects of surgery^(34,35). Microsurgeons typically acquire their initial skill through months of practice on animal models labs, at which points, they still require months of supervision in the operating room. Microsurgery simulators are still in their early stages of development and not widely available. Some devices have been developed by many groups. For example, a VR system was developed in 2002 for the graphical visualization of complex surgical objects with real-time interactions, using real surgical tools. It incorporates software consisting of a deformable object simulator, a tool simulator, and a collision detection module. The virtual environments simulate microvascular vessels anastomoses to monitor the progress of the trainees as well as to compare their performance to those of an experienced surgeon⁽³⁶⁾.

Web – Based learning

The flexibility and interactivity of the internet combined with the quick access and low cost of information that it provides led to the introduction of Web-based education in medical field. Web-based learning (WBL) encompasses all educational interventions that use the internet or local intranet. It is also called online learning, E-learning, distributed learning or internet- based learning⁽³⁷⁾.

WBL comes in many different forms and configurations, ranges from highly structured tutorials to free-texts online searches. Currently there are three broad configurations in the WBL: tutorials, online discussion

groups and virtual patients⁽³⁸⁾. Online tutorials are similar to face-to-face lectures. They generally consist of information structured by the teacher in a way that facilitates learning. Tutorials are often enhanced by features such as multimedia (sound, pictures, movies, and animations), links to online resources (full-text journal articles or related websites) and other areas within the course, and self-assessment tools. However, online tutorials suffer from some drawbacks such as the fact that they are fixed and may not match the level of knowledge for a given learner^(38,39). Online discussion is similar to face-to-face small group session. Teachers take on the role of facilitators – defining the scope of the discussion, monitoring and guiding the discussion as needed, and providing or helping students to find additional resources. Communication among group members can be asynchronous (delay between sending a message and receiving the response) or synchronous (live)⁽³⁸⁾. One of the challenges regarding the use of online discussion groups is motivating the learners to participate in the discussion; otherwise the course will quickly flounder. Also, e-learning discussion frequently consists of superficial comments and social conversations that fail to stimulate deep cognitive engagement⁽⁴⁰⁾.

Web-based learning provides many advantages for learners. The most obvious advantage is that it enables distant learning and facilitates the teaching of students scattered across different practice sites, cities and even different countries. This distance independence gives learners the opportunity to participate in the same instructional activities regardless of physical location. Unlike the lectures which are given at fixed time, WBL offers flexibility in timing of participation as learners can access a WBL tutorial or virtual patient at any time day or night^(38,41). Furthermore, WBL facilitates several instructional methods that would be infeasible

or at least difficult to provide using the traditional settings. For example, virtual patient simulators can present medical students with a wide variety of patients and medical contexts. This provides the opportunity to ‘experience’ uncommon scenarios facilitates their repetition and allows communication of detailed performance-based feedback. Multimedia (colour, sound, video, photographs, graphics, and animations) can enrich a course in ways that would be difficult to achieve using a textbook⁽³⁸⁾. Web-based learning facilitates assessment in a flexible way and also allows immediate customized feedback. In summary, the strength of e-learning is concentrated on its ability to standardize a course content and delivery allowing learners to have control over the content, learning sequence, pace of learning, time and often media which helps learners to meet their personal learning objectives⁽⁴²⁾. Although WBL has many advantages, concerns are raised regarding its effect on building social isolation of the learners who are studying using internet tutorials and virtual patients alone. Also, the use of online discussion groups is feared to undermine the team work and distract from interpersonal relationships and communication skills. The high cost of constructing an effective online course tutorial or virtual patient is another drawback of WBL that may limit its wide spread application. Furthermore, technical problems which are inevitable in the computer world can seriously disrupt an online course⁽³⁸⁾.

In conclusion, although The Halstedian method of training has produced many generations of fine surgeons, this system has been challenged by many economic, time and ethical constraints. Increasing skill requirements are forcing surgeons to examine newer methods of learning to perform operations. There is support from the educational literature for training surgeons using technologies which are proved to be

advantageous in providing a safe, controlled environment with documentation of the learner's behaviour and outcome, repetition as well as deliberate practice. However, the

present cost, limited computing power, and lack of validation hamper the rapid incorporation of these tools into surgical residencies and training centers.

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Journal Review

International journal harvest: Interesting topics

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Does Colonoscopy Work? Impact of colonoscopy on colorectal cancer (CRC) incidence and mortality

David G Hewett, MBBS, Charles J Kahi, MD, MSc,
Douglas K Rex, MD
Natl Compr Canc Netw 2010;8(1):67-77

Abstract

Through its impact on the adenoma-carcinoma sequence, colonoscopy has a central role in the detection and prevention of colorectal cancer (CRC). Observational data support a protective effect of colonoscopy and polypectomy on CRC incidence and mortality. However, recent studies suggest that the degree of CRC protection afforded by colonoscopy is dependent on the effectiveness of identification of prevalent cancers or their precursors, particularly in the proximal colon. Biologic variation in tumor genetics and growth likely contribute to diminished protection in the proximal colon. Operator variability is known to be a key factor predicting adenoma detection. Evidence supports the immediate adoption of specific quality improvement initiatives to reduce the failure rate of colonoscopy. Further interventions should target individual, organizational, and health system factors which influence physician behavior.

Comments

This is a timely review which deals with a practical and important health problem worldwide.

In spite of the scarce availability and the high cost of colonoscopy, as well as the comparatively lower incidence of colorectal cancer in our community, still this procedure remains an important tool for surveillance and diagnosis of colonic disorders including CRC.

Colonoscopy is an operator-dependent procedure and provides better protection against left-sided CRC than right-sided. Given the documented variation among operators, the

most significant improvements in the effectiveness of colonoscopy will come not from technical improvements alone, but from quality interventions that seek to standardize and enhance the performance of individual physicians responsible for CRC prevention.

General anesthesia: a reversible coma, not sleep

December 30 issue of The New England Journal of Medicine

Despite what anesthesiologists may tell surgery patients, the brain under general anesthesia is not "asleep," it is placed in a reversible drug-induced coma, according to 3 neuroscientists who reviewed and synthesized the latest research in general anesthesia, sleep, and coma.

This review was prompted by a recognition that common brain circuit mechanisms may underlie aspects of general anesthesia and recovery from coma and that thinking through the links across these phenomena and their distinction from the natural processes of sleep would reveal important insights. Measuring brain circuit mechanisms may lead to greater diagnostic accuracy and targeted therapeutic strategies for predicting and supporting the recovery process from coma after severe brain injuries and monitoring brain function under general anesthesia may also help in developing new sleep aids.

General anesthesia, the scientists say, is functionally equivalent to brainstem death, and perhaps explains why some patients do not fully recover consciousness for several hours after general anesthesia, as well as why postoperative cognitive dysfunction could persist in elderly patients for several months afterward.

One thing which is evident regarding recovery from general anesthesia is that it tracks the return of function in the brainstem from bottom(respiration) to top (eye-movements and arousal centers).

Comments

We hope that this article will facilitate more informed discussions among anesthesiology, sleep, and coma researchers and lead to new approaches to creating the state of general anesthesia, sedation, and sleep, as well as new approaches to facilitating coma recovery, and also lead to better education of the public about general anesthesia.

One incision as good as four, for Laparoscopic cholecystectomy

Arch Surg. 2010;145:1187-91

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The study retrospectively compared 41 patients who underwent SILS cholecystectomy with 58 who had the standard four-port laparoscopic procedure. The groups were not well-matched, with the standard laparoscopic group being significantly older.

The main differences between the procedures were operative time and hospital length-of-stay after surgery. SILS required a mean of 126.0 minutes, while the standard approach took 95.8 minutes. However, SILS brought the mean hospital stay down by half, from 1.53 to 0.76 days.

Complications occurred with both procedures (including one postoperative bile leak in each group), but the groups were too small to report complications as outcomes.

Comments

Although the study is small, involving less than 100 patients overall, but shows that single-incision laparoscopic surgery (SILS) is at least as good as the four-port laparoscopic approach and therefore should be offered to patients, it's as safe as the standard procedure, (and it) can be done in the same time frame. Patient demand will more likely drive the process forward, and surgeons should be better equipped for the transition.

However, this conclusion remains to be confirmed in a well randomized studies in future.

2010 American Heart Association Guidelines for cardiopulmonary resuscitation and emergency cardiovascular care

Field JM, Hazinski MF, Sayre MR, et al
Circulation. 2010;122:S640-S656

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The year 2010 marks the 50th anniversary of the introduction of cardiopulmonary resuscitation (CPR). During these past 50 years, tremendous research has been conducted to evaluate techniques, medications, and devices designed to advance the care of victims of cardiac arrest. The American Heart Association (AHA) developed the first CPR guidelines in 1966 and since that time has published frequent updates of the guidelines to help educate the public and medical establishment about optimal care for patients with cardiac arrest and other emergency cardiovascular conditions.

This past November, the newest set of guidelines pertaining to CPR and emergency cardiovascular care were published by the AHA in a supplement issue of circulation.

Study Summary

Change from "A-B-C" to "C-A-B."

A major change in basic life support is a step away from the traditional approach of airway-breathing-chest compressions (taught with the mnemonic "A-B-C") to first establishing good chest compressions ("C-A-B"). There are several reasons for this change.

- Most survivors of adult cardiac arrest have an initial rhythm of ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT), and these patients are best treated initially with chest compressions and early defibrillation rather than airway management.
- Airway management, whether mouth-to-mouth breathing, bagging, or endotracheal intubation, often results in a delay of initiation of good chest compressions. Airway management is no longer recommended until after the first cycle of

chest compressions -- 30 compressions in 18 seconds. The 30 compressions are now recommended to precede the 2 ventilations, which previous guidelines had recommended at the start of resuscitation.

- Only a minority of cardiac arrest victims receive bystander CPR. It is believed that a significant obstacle to bystanders performing CPR is their fear of doing mouth-to-mouth breathing. By changing the initial focus of resuscitation to chest compressions rather than airway maneuvers, it is thought that more patients will receive important bystander intervention, even if it is limited to chest compressions.
- Pulse checks by lay rescuers should not be attempted because of the frequency of false-positive findings. Instead, it is recommended that lay rescuers should just assume that an adult who suddenly collapses, is unresponsive and not breathing normally (e.g. gasping) has had a cardiac arrest, activate the emergency response system, and begin compressions.
- Basic life support: The traditional recommendation of "look, listen, and feel" has been removed from the basic life support algorithm because the steps tended to be time-consuming and were not consistently useful.

Comments

These new amendments in the CPR guidelines are important and should be included in the protocol for CPR courses. Also, the new changes made it easier for the untrained (bystander) to perform the procedure as mouth to mouth breathing was difficult to do.

Non invasive predictors of large esophageal varices

Cherian JV, Deepak N, Ponnusamy RP, Somasundaram A, Jayanthi V.
Saudi J Gastroenterol 2011;17:64-8

Variceal bleeding is a serious complication of portal hypertension, occurring in up to 30% of patients with cirrhosis. Despite improvement in diagnosis and therapy, mortality from acute

variceal bleeding may still reach up to 20%. In our setting, bilharzial periportal fibrosis is the leading cause of portal hypertension. Other causes include HBV, HCV infection, alcohol consumption, autoimmune hepatitis, and metabolic liver diseases.

Currently, the most reliable and accurate method to detect the presence of large esophageal varices is an upper gastrointestinal endoscopy. However, this method is invasive and not always widely available. Over the years, a great effort has been made either to introduce less invasive, alternative to standard endoscopy diagnostic methods or to restrict the performance of endoscopy in high-risk patients by using a variety of non-invasive predictors.

In this issue of the Saudi Journal of Gastroenterology, Cherian et al report three non-endoscopic predictors for the diagnosis of large esophageal varices: low platelet count, Child-Pugh class, and spleen diameter, in a prospective study, where 229 newly diagnosed patients with liver cirrhosis, without a history of variceal bleeding, were included. Patients were mainly of Child-Turcotte-Pugh class B (55.5%) and the cause of cirrhosis was alcohol consumption (42.4%) followed by B or C viral hepatitis (25.3%). Overall, 178 patients had varices (77.7%) while 81 (35.4%) had large varices. On multivariate analysis Child-Turcotte-Pugh B/C, platelet count <90,000 per ul and spleen diameter >160 mm were significant predictors for the presence of large esophageal varices.

Comments

Although a number of studies have explored this issue, no single parameter or combination of parameters has so far been widely established as a reliable noninvasive predictor of the presence of varices. Therefore, upper gastrointestinal endoscopy remains the gold standard for the diagnosis of gastroesophageal varices. However, using noninvasive predictors could be the alternative to endoscopy in cirrhotic patients who are at high risk for bleeding, or where endoscopy is not widely available.

Obituary

Tribute to the late *Professor Isam Mohammed Abdel Salam AlEgail* *Trait of a good leader*

(20 February 1948 – 01 August 2010)

The premature departure of Professor Isam left a vacuum not only in the University of Medical Sciences & Technology, but also in the practice of surgery and medical education in the Sudan at large. His last post was as professor and head department of surgery in the Faculty of Medicine in the University of Medical Sciences & Technology (UMST).

He contributed to the establishment of the Academy Charity Hospital, Imtidad (Khartoum 3 extension). He was the founding director of the hospital (28/08/1999) and during his tenure he promoted the service with vision and dedication.

Professor Isam was born in Omdurman on February 20, 1948. He was an Omdurmanian boy, which coloured his life to being hospitable, socially sensitive and considerate. He, by nature of his extended relationship and good character and loving personality, spent good time participating in social events, attending funerals and patients' visits in hospitals and homes.

He graduated from the University of Khartoum in the year 1972 and worked in different parts of Sudan including Rumbek Hospital in South Sudan. He obtained the Irish Surgical specialization and returned to work in Sinnar, and then Khartoum Teaching Hospital as a gastrointestinal surgeon. During this period he had shown enthusiasm and great professionalism in his work and he was one of the founders of upper gastrointestinal endoscopy in the Sudan.

He left to Al Ain, United Arab Emirates (UAE) and there he was trained as a Laparoscopic surgeon. Being a true national, he used to come to Sudan on his vacations and train surgeons on Laparoscopic surgery in Sudan clinic. He was no doubt the father of laparoscopic surgery in the Sudan. He was not one of those who felt friction heat generated by the youngsters who would like to find their place among the seniors. Professor Isam was able to give and train as he foresaw this as extension to his life. This is exactly what happened, many trained under him are now performing a good job and helping the patients. This unselfish attitude and dedication to his profession produced many competent practitioners



who are now carrying on his work, and helping care for patients exactly as Professor Isam would have done himself.

A remarkable trait of this great man is his ability to live and work with friendly and unfriendly individuals in the medical profession. His character traits of politeness and being considerate to others served him well as he travelled to other countries, and made him a sought-out leader wherever he went. Some of the more notable of his many accomplishments are: He helped establish and run the surgical specialization in the Sudan Specialization Board and elected to serve in Sudanese Association of Surgeons for many rounds.

Professor Isam left behind a widow Mrs Gamar Al Tayeb Ibrahim, and 3 beautiful daughters Dr. Yosra, Alla & Olla and a son Dr. Mohammed. He was blessed to have two of his children become medical doctors.

It is with great sorrow that we announce the loss of this great surgeon. His loss is a personal tragedy to me as I have been a very close personal friend of his. I found refuge in my relationship with him, and his accommodating selfless ways, from many of my problems. I have many good memories, and happy moments shared with him that I shall cherish the rest of my life.

May Allah Bless his soul and reward him with *AL Fardous*.

Professor Mamoun MA Homeida
President, UMST

Obituary

Tribute to the late *Professor Siddig Ahmed Ismail* *Educator and trainer; a man larger than life*

(19/3/1936 – 13/9/2010)

Professor Siddig is one of the great masters in medicine and medical educator in Sudan.

He graduated from Faculty of Medicine, University of Khartoum in 1959 with a distinguished undergraduate record; he was awarded with distinction and prizes in medicine, preventive medicine, forensic medicine, pharmacology and physiology.

After a short period as a registrar, he was sent on scholarship to UK in 1965 where he obtained the Membership of the Royal College of Physicians (MRCP-London), and later the fellowship (FRCP-London).

He was appointed as lecturer in medicine in the Faculty of Medicine, University of Khartoum (1966-69) and then he opted to terminate his secondment to the university and returned to the Ministry of Health (MoH).

In the Ministry of Health he was appointed as a cardiologist (1969-74) and later promoted to post of the senior cardiologist (1974-81). All through this period he maintained his contact with the Faculty of Medicine as a part-time teacher for undergraduate, and graduate students, and a supervisor for several master's theses of graduate students. He chose a career in cardiology and was trained at St Georges Hospital, UK for one year. Later in 1969, he had post-doctoral training in Hammersmith Hospital and Middlesex, UK and in 1972 at The National Heart Hospitals, UK.

He was reappointed as professor of medicine in University of Khartoum on 1/9/1981.

In 1982, he was the first Sudanese to be elected as Fellow of the American College of Cardiology (FACC) in recognition of his professional and academic achievements.

On 26/2/1986, he was appointed as assistant dean of graduate college and director of medical and pharmacy committee.



On 7/3/1987, he was appointed as director of medical post graduate board for three years. On 22/5/1990, he was appointed dean of graduate college, University of Khartoum where he became the longest serving dean for that college, serving until 14/6/2000.

In recognition of his distinguished career as a teacher and professional and his immense contribution to the development of the University of Khartoum the senate and council of the university unanimously awarded him the status of "*Emeritus Professor*" in 26/1/2002.

In the university, he sat on different governing bodies including the university council and the university senate. He also chaired and was chief advisor in many key committees including the appointment and promotion committees. One of his important contributions to the university was a report on institutes and centers in University of Khartoum which identified areas of strengths and weakness in these academic institutions and made bold recommendations for reform.

In recognition of his academic and professional status Professor Siddig was

chosen as MRCP Examiner in the Royal College of Physicians UK, Arab Board Council member and examiner to Pakistan College of Physicians and Surgeons.

He was also a temporary advisor to WHO as a member of a consultative regional group for sharing of experiences on graduate training. He was a member of WHO committee on rheumatic fever.

Excellence in clinical teaching

I have first met Professor Siddig in 1969 as a fourth year medical student and later as senior student in fifth and sixth year and was immediately struck by his impressive dominant assertive and passionate character. His passion for perfection and clinical and professional excellence and his insistence on punctuality and patient welfare was superb. As an educator and trainer he was so keen on equity of availing chances to every student in the group and practical demonstration and guidance through detailed steps of clinical examination. In discussion, he was keen to link clinical findings with basic sciences and pathology and probe logical clinical thinking and impact of social factors on the patient and the management plans. We were certainly outclassed and overwhelmed with his immense knowledge on literature, poetry, culture and history and were frequently humbled by probing questions in those areas during his clinical rounds. His flawless English language, dominating and yet witting and supportive style of teaching was an inspiration to all of us.

Later as house officers we saw the other side of Professor Siddig who was certainly available for guidance support and consultation for us “young colleagues!”. His compassion, modesty and humane demeanor were compelling.

I would like to quote a paragraph from a confidential assessment report to the Vice-chairman of the University of Khartoum about Prof Siddig’s reappointment as a professor by J. Pilcher MD FRCP Consultant Cardiologist

in UK in 17/3/1981 that is most revealing as a role model:

(I ought to tell you that I do not know Professor Siddig on a personal level, having met him in a few international conferences. However, I know him well from colleagues in UK and more particularly from Sudanese medical graduates working in UK.

Over the years now, I had several graduates from University of Khartoum working with me either as SHO’S or Registrars. I have been most impressed by them. They have been of high professional competence and obviously well taught. They were all been taught cardiology by Professor Siddig. Since cardiology is my own discipline I have been particularly impressed by their teacher also).

Cardiology is a branch of medicine that trains for logical and lucid deduction from basic facts. Professor Siddig’s students have demonstrated this thinking most admirably.

Under the leadership of Professor Siddig the degrees offered by the Postgraduate Medical Studies Board were recognized by regional and international certifying professional bodies, there were more graduates, more medical, dental and pharmacy graduate programs were created, the enrollment numbers increased and partnerships with MoH and other universities was strengthened. Important links were created with the Royal Colleges in UK.

He was the longest serving Dean of Graduate College in University of Khartoum where his tenure was renewed for ten years. During his tenure the faculty developed more quality assurance measures for graduate education programs and supervision in research.

More graduate programs by courses and research were developed including much needed graduate programs for capacity building at national level in economics, business administration, engineering, computer sciences, agriculture and forestry, veterinary sciences, education and humanities. The faculty was in charge of training of the

teaching assistants and lecturers in the university; more training chances were availed in Europe and regionally.

The number of foreign graduates enrolled through bilateral relations with universities in the region or individual application increased including students from Saudi Arabia, Libya, Yemen, Syria, Nigeria, Palestine, etc.

His administration and leadership was characterized by compassion, firm discipline and supportive supervision as well as transparent clean handed fiscal control. As the next dean of Graduate College I had the chance to build on these strong foundations and witnessed how the staff in the faculty adored and respected him and is certainly extremely grateful to his guidance, support and encouragement.

Professor Siddig was well reputed as a senior professor for his passion and dedication to see that University of Khartoum standards in education and research are adhered to and that international standards are to be applied. He was renounced for his candid but respectful opinion in the senate and his strict assessment

and judgment of applications for appointment and promotion and was considered the main reference and advisor on rules and regulations. His vast experience, impartial judgment and dedication earned him immense respect.

His contribution and leadership in the profession was well documented in the passionate obituary written by Dr Al Malik in the British Medical Journal, 341 on 29th November 2010.

Professor Siddig was a true role model distinguished teacher, a dedicated professional, an inspiring professional and educational leader and a compassionate modest and proud Sudanese who contributed immensely to the Sudanese community and its welfare all through his life and raised the banner of Sudan in regional and international professional associations with distinction. He was certainly a man larger than life.

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