Interest in prevention and control of schistosomiasis in the Sudan had been aroused and intensified by the establishment of the Gezira irrigation Scheme in 1925 and the successful treatment of schistosomiasis by antimony tartarate as a result of the work of Christopherson in Khartoum hospital in 1918. The health authorities were well aware of the consequences of bilharzia in the Gezira irrigation scheme – failure to prevent would be disastrous and probably irreversible (Annual Report of Health Services1926, Sudan). Measures adopted included screening of workers and compulsory treatment of infected people and snail control. The results of these measures were monitored by annual surveys. Between 1926 and 1935, 10,000 – 20,000 men were examined; the prevalence varied between 0.06 and 0.77% and among thousands of children screened, between 0.22 and 1.12 % were infected. Although the authorities were pleased, the situation deteriorated World War II and the neglected intestinal bilharzia replaced urinary infection as the main problem in the Gezira (Stephenson, 1947) since then, a large scale application of copper sulphate molluscicide was carried out only in 195556. Because of the limited snail control measures, the inefficiency of the antimony drug and increased population movements, prevalence of schistosomiasis increased steadily and by the 1970s prevalence rates of up to 70% were reported in school children (Amin and Fenwick 1978, Fenwick et al. 1982).

**Bilharzia Department**

In late 1967, a Bilharzia Department was established for the first time at the Public Health Laboratories (Stack Laboratory) of the Ministry of Health (MOH). Apart from the founder (Dr Mutamad A Amin), the Department had no staff, no budget, no equipments and no transport. During the period from 1967 to 1970 studies were initiated by personal efforts to evaluate the existing control measures, use of copper sulphate and mechanical barriers in the control of schistosomiasis (Amin 1972a and Amin 1972b).

**London Khartoum Bilharzia Project**

In 1970, the London Khartoum Bilharzia Project (Agreement between London school of Hygiene and Tropical Medicine, Faculty of Medicine University of Khartoum and the National Council for Research (NCR) in collaboration with the MOH) was established. Professor Ahmed Mohamed El Hassan, Chairperson of the Medical Research Council (NCR) was instrumental in finalizing the agreement. The project was managed by Dr Mutamad A Amin. The long term objective of the project was to recommend evidence-based schistosomiasis control procedures for the Gezira Scheme. The immediate objective was to train young British and Sudanese scientists in aspects of tropical medicine, mainly schistosomiasis and malaria. Two British scientists (Professor Alan Fenwick and CH Teesdale) were recruited to participate in schistosomiasis research. The financial support from UK was used to equip the laboratories in Omdurman Hospital for Tropical Diseases and the establishment and equipments for the Institute of Tropical Medicine (Late Professor Abdel Hamid Sayed Omer was its first director). Several post-graduate students and researchers from various faculties of the University of Khartoum joined the project. The research findings of these studies were documented in several publications (Amin et al. 1976, Amin and Fenwick 1978, Fenwick et al. 1981, Amin et al. 1982, Fenwick et al. 1982, and Kardaman et al. 1983, etc). The research outcome of the London/Khartoum Bilharzia Project formed the basis of the schistosomiasis control strategies within the comprehensive plan of the Blue Nile Health Project.

**The Blue Nile Health Project (BNHP)**

The idea of an integrated control programme for schistosomiasis and malaria in the Gezira irrigated scheme was proposed in the WHO Traveling Seminar held at Haseeb Conference Hall, National Public Health Laboratories, in the late 1970s. Expert and advisors from WHO Geneva and Eastern Mediterranean Region participated in the Seminar together representatives from MOH, University of Khartoum and the National Council for Research. The conference endorsed the proposal for establishment of an integrated programme. WHO wrote to Sudan Ministry of Health supporting the recommendation of the conference and showed interest to assists in the formulation of the integrated project. A team of international and local experts was formed under the leadership of Dr Ahmed Ayoub El Gadal (MOH) to prepare the project document. The experts prepared a comprehensive integrated plan, 1979-1990, to control malaria schistosomiasis and diarrhoeal diseases in Gezira/Managil and Rahad Schemes. The project was named Blue Nile Health Project (BNHP). This is a joint venture between the Government of the Sudan represented by the Ministry of Health and the World Health Organization. A presidential decree was issued for the establishment of the project indicating the involvement of relevant ministries and institutions. The BNHP was a great success story in the history of control of water associated diseases. Unfortunately this success could not be sustained and the mission was not accomplished in Managil zone as a result of lack of funds and disintegration of the project. This is because schistosomiasis was not given enough concern by policy makers and health authorities (For further details see El Gadal, 1985).

**State-of-the-art**

Now within the whole of the Sudan there has been a serious increase in endemicity and prevalence of schistosomiasis as a result of expansion in water resource development projects, population movements and limited control measures and more important lack of political will. More than seven million
people are expected to be infected in the whole Sudan (Amin & El Hussein 2009). The meetings of the Sudanese Association of physicians held in Wad Medani on 4-6th February 2011 on schistosomiasis and the symposium on portal hypertension (Schistosomiasis) of the Sudanese Society of Gastroenterology and Sudanese Association of Surgeon held in Khartoum on 22nd April 2011, have demonstrated beyond doubt the disastrous effects of schistosomiasis, a warning predicted by the health authority in 1926.

The Schistosomiasis National Control Programme

The Schistosomiasis National Control Programme operates vertically from Khartoum with coordinators in the endemic states. Chemotherapy is the main intervention strategy when drug is donated. The facilities of the programme are extremely meager and local operational finance is a drop in the ocean. If the responsible health authorities in the Sudan want to avoid the increasing disastrous health and economic effects of schistosomiasis, we need a multidisciplinary approach to eliminate schistosomiasis involving the available potential experts from universities and relevant ministries. This would require a presidential decree. The Sudanese did it before and they can do it now.

References


Primary prophylaxis and emergency treatment of variceal bleeding

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Magnitude of the problem

Variceal bleeding is a major cause of morbidity and mortality in Sudan. Data from Mohamed Salih Idris bleeding centre in Khartoum shows that 77 % of bleeding is variceal in origin. Majority of those affected are males and up to 50 % are less than 45 years of age(1).

Predictive factors for variceal bleeding

In general, large varices, red colour signs and advanced liver disease are markers of increased risk of bleeding. Other risk factors from local experience(2):
• A splenic longitudinal dimension of more than 11 cm
• Periportal fibrosis worse than grade I
• Varices more than grade 1

Management Objectives

• Control of acute variceal bleeding
• Prevention of recurrent bleeding (2ry prevention)
• Primary prevention

Acute management
1. IV access / Blood tests
2. Assessment
3. Resuscitation
4. Medical treatment
5. Endoscopy
6. Balloon tamponade
7. Surgery

Two wide bore cannulas in each arm and blood drawn for following tests:
1. Complete blood count
2. Urea & electrolytes
3. Liver function tests
4. Cross matching
5. Prothrombin time

Clinical assessment is essentially to look for:
1. Pulse BP urine output (ie signs of shock)
2. Signs of portal hypertension
3. Stigmata of chronic liver disease
4. Comorbidity (cardiac …)

Resuscitation

ABC
• Airways
• Breathing
• Circulation (hypovolaemia)
Intravenous fluids
- Gold standard is blood
- PlasmacExpanders
- Fresh frozen plasma / platelets if needed
- IV saline
- Avoid prolonged hypovolaemia
- Avoid overtransfusion

Medical treatment
Vasoactive Drugs
- Terlipressin (glypressin)
- Octreotide
A systematic review has concluded that terlipressin is a safe and effective treatment for acute oesophageal variceal bleeding, with or without adjuvant endoscopic sclerotherapy. Furthermore, terlipressin appears to reduce mortality in acute oesophageal variceal bleeding compared to placebo, and is the only pharmacological agent shown to do so.

Patient stabilized
Endoscopy
- Identify the source of bleeding
- Assess the risk of recurrent hemorrhage
- Attempt to control the bleeding and prevent recurrent hemorrhage.
- Best at endoscopy unit with trained staff.
- Theatre is a good alternative.
- Can be done at ICU.
- Sclerotherapy and rubber band ligation are both effective in achieving primary haemostasis. The choice between the two depends on availability and expertise of the endoscopist. Ethanolamine olate 0.5% for oesophageal varices is locally produced and costs 10 cents / 5 mls. N-butyl-2-cyanoacrylate (histoacryl) is used for gastric varices.

Rescue therapies
Sengstaken-Blakemore tube
The use of Sengstaken-Blakemore tube when a massive variceal bleeding is suspected allows initial control of bleeding in up to 80% of patients. Nevertheless, its use is associated with potentially lethal complications such as aspiration, asphyxia due to balloon migration and perforation which are associated with a high mortality. Therefore, its use should be restricted to patients with uncontrollable bleeding for a short period of time (< 24 h) as a bridge to a more definitive therapy. Airway protection should be considered when balloon tamponade is used.

Devascularization and shunting procedures.
Occasionally, hemostasis fails despite the combination of endoscopic and pharmacological therapy. Shunting of the hypertensive portal venous system to the normotensive systemic venous circulation would be inevitable. Surgical treatments for variceal bleeding include direct esophageal devascularization of the lower esophagus and the proximal stomach as well as a variety of surgical shunting procedures. Intrahepatic portosystemic stent shunt (TIPSS) is not currently available in Sudan.

Antibiotics
In patients with cirrhosis and variceal bleeding, antibiotics reduce variceal rebleeding and improve survival. However, evidence from surgical literature suggests aerobic bacteria on mesenteric lymph nodes as a consequence of bacterial translocation may play a role in the development of postoperative infectious complications, particularly in schistosomotic patients. It is therefore wise to recommend prophylactic antibiotics in acute variceal bleeding.

Prevention of recurrent bleeding (secondary prevention) sclerotherapy
Experience in Sudan indicates that endoscopic sclerotherapy is effective and safe. Full obliteration of varices achieved in 93% of patients after an average of four sessions. Variceal band ligation if available is equally effective.

Betablockers
In a large double blind placebo controlled 24-month-study in Sudanese patients propranolol reduced rebleeding and increased survival in patients with portal hypertension secondary to schistosomiasis. Furthermore, a recent study from India revealed equal efficacy of endoscopic variceal ligation and propranolol in preventing variceal bleeding in patients with non-cirrhotic portal hypertension. Propranolol should therefore be started in a dose of 20 mg twice daily and increased at increments of 20 to 40 mg on alternate days until the patient achieved a heart rate of 55 bpm or a 25% reduction from base line. If side effects were observed reduce dose to previous tolerated level.

Combination treatment
A large study from Mansoura in Egypt comparing sclerotherapy alone against sclerotherapy + betablockers shows combination group had a lower rebleeding rate (14.3% vs 38.6%), lower variceal recurrence after obliteration and longer period between variceal obliteration and recurrence; but no change in mortality. Patients treated with sclerotherapy should therefore be given propranolol for long-term management.

Summary of acute management of acute variceal bleeding (Fig 1).

Fig 1: Suggested Algorithm of management of acute variceal bleeding

![Algorithm](image)

BB betablockers, EST endoscopic sclerotherapy, VBL variceal band ligation
Prevention of development and progression of oesophageal varices

Pre-primary prevention (before development of varices)
Field work in Gezira, Sudan demonstrated that annual treatment of children with praziquantel not only prevents the appearance of Symmers’ fibrosis, but may also reverse this schistosomal-induced pathology. Another study from Ethiopia in 199 subjects (mean age = 24.0 years, range = 7-68 years) concluded that schistosomal periportal fibrosis may be reversible early in the disease course following treatment with praziquantel. A significantly higher proportion of subjects with mild lesions had resolution/improvement of periportal fibrosis/thickening. Resolution was significantly more frequent at a younger age, among seronegative for hepatitis B virus and among those with a lower frequency of post-treatment recurrence of schistosoma mansoni infections.

Primary prevention (of first bleed)

Praziquantel
There is some evidence from field work in Gezira, Sudan showing that the effect of single-dose praziquantel may result in reduction of the grade of oesophageal varices. Praziquantel should therefore be considered in all patients with bilharzial periportal fibrosis with or without oesophageal varices.

Propranolol
The role of betablockers in primary prevention in cirrhotic portal hypertension is well established. Evidence in bilharzial periportal fibrosis is surprisingly lacking. However, treatment with propranolol reduces variceal pressure and wall tension in schistosomiasis presinusoidal portal hypertension. It is therefore recommended that patients are treated with propranolol long term.

Summary of prevention (Fig 2).

Conclusions
- Bleeding due to oesophageal varices is the commonest cause of upper GI bleeding in Sudan. It is a major health / economic problem.
- Resuscitation … Saves lives
- Endoscopic injection sclerotherapy is a valuable therapeutic modality.
- Beta blockers equally important.
- Combination of endoscopic therapy and betablockers is effective in preventing recurrent bleeding (secondary prevention).
- Praziquantel for pre-primary prevention coupled with propranolol for the prevention of first bleed (primary prevention).

References
Summary

Why is prevention of rebleeding necessary?
In cirrhosis 30% of patients with asymptomatic varices are expected to bleed within one year of diagnosis. A first variceal bleed is associated with a 6 weeks mortality of about 20 to 30%. Untreated patients surviving a first bleed, have a 1 to 2-year risk of rebleeding and a risk of death of about 40 to 50%.(1,2) However with modern therapy bleeding related mortality has declined to 20% at 6 weeks.(3) This differs markedly from schistosomal periportal fibrosis in which only 15% of patients with asymptomatic varices are expected to bleed within a span of 6 years.(4) Although 50% of those who bleed are expected to rebleed within 1 year, the disease follows a benign course and because of good hepatic function patients can tolerate repeated episodes of variceal rebleeding.(5) However untreated, 20% will die over a span of 4 years.(6) Hence whether one is dealing with cirrhosis or schistosomal periportal fibrosis, following a first variceal bleed, efforts should be exerted to prevent rebleeding. The options available for long term prevention of variceal rebleeding (secondary prophylaxis), are drug therapy that includes combination beta blockers and nitrates, endoscopic therapy, and surgical intervention.

Pharmacologic and endoscopic therapy:
Combination drug therapy in the form of nadolol and isosorbide-5-mononitrate have been shown to be superior to both endoscopic sclerotherapy(7), and beta blockade alone.(8) Although endoscopic band ligation is superior to endoscopic sclerotherapy,(9,10) there is no difference between it and combination pharmacologic therapy in rebleeding, complication rates or mortality, and both are associated with high rates of bleeding recurrence.(11,12) In addition, even after complete eradication of varices by endoscopic sclerotherapy, varices recur in 53% of cases with a rebleeding rate of 57%(13).

Surgical options in schistosomal varices:
Surgical treatment for bleeding schistosomal varices in the form of total portosystemic shunts are not an option because of encephalopathy, progressive liver failure, shortened survival(14), and potential pulmonary hypertension secondary to fibrosis induced by shunting of worms and their products into the pulmonary bed(15,16). The distal (selective) splenorenal shunt is associated with a very low rate of recurrent variceal bleeding, but carries about a 15 percent risk of encephalopathy in the long run, with diminution of the liver size, reduced portal vein diameter and increased formation of collaterals between the high pressure portomesenteric and the decompressed gastrospenic compartments(16). Splenectomy and oesophagogastric devascularisation carries a zero rate of encephalopathy but is associated with a 20% rate of bleeding recurrence(15,14). Despite this, it carries the best long term survival compared to total shunts and the distal splenorenal shunt(14). In addition when the operation is combined with salvage sclerotherapy for rebleeding, it is associated with only 3 to 5% long term mortality at 10 years follow up.(17,18). More recent work have shown that combining splenectomy and devascularisation with endoscopic rubber band ligation is associated with a very low rate of recurrent variceal bleeding in the region of 8% at 3 years follow-up(19). To maximize the cost effectiveness of treatment, the selective addition of endoscopic therapy based on portal blood flow parameters(20), the operation of splenectomy and devascularisation seems to offer the best option for secondary prophylaxis in good risk patients in our prevalent circumstances. Endoscopic and pharmacologic therapy should be reserved for poor risk patients.

References

Prevention of rebleeding from oesophageal varices: what is the best approach for secondary prophylaxis?
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Endoscopic injection sclerotherapy was originally described in 1939 by Crafoord and Frencker in their published article: New Surgical treatment of varicose veins of the oesophagus. With the introduction of Balloon tamponade and Vasopressin, its use has been reduced for years. Terblanche J from Cape Town, South Africa has reintroduced the use of sclerotherapy during early 1980s. He has published a work in 1988: The experience of sclerotherapy in Sudan, teaching hospital, Soba University hospital. In Ibn Sina specialized hospital endoscopic sclerotherapy has started in the year 1986 as elective procedure regularly and few emergency cases and the number of patients increased continuously reaching 2000 patients per year. A published paper: Endoscopic sclerotherapy experience in The Sudan, Baba et al, 1070 patients, 10 years duration, has proved that endoscopic sclerotherapy is essential and cost-effective for the management of bleeding oesophageal varices. It has few complications, 93.9% of the causes of oesophageal varices is bilarharzial portal hypertension. In the year 2004 Mohammed Salih Idris
Scientific Events
Symposium on upper gastrointestinal bleeding by SSG

Bleeding Centre was established and started the management of emergency patients with G.I. bleeding with adequate set-up, equipments and staff. A published data by Hamza et al: A look into one year of management of acute G.I. bleeding, M.S.I. Centre has shown that the outcome of management of patients has improved very much, 75% of G.I. bleeding causes is oesophageal varices and the mortality has been reduced down to 4.5%.

In conclusions,
1) EST is an essential component in the management of bleeding varices caused by portal hypertension.
2) EST can be used for management of bleeding oesophageal varices were banding is not available or expensive.
3) EST is still the standard therapeutic modality for treatment of gastric varices especially grade 3-(fundal) varices.
4) EST is used for oesophageal varices in emergency situations during active bleeding, where banding is difficult to apply due to poor visualization.
5) Experience of EST in The Sudan is well established and for a long time more than 25 years. This has lead to the idea of having a new Specialized CENTER for EMERGENCY GI BLEEDING.
6) This centre has improved the management of acute G.I. bleeding as follows: reduced hospital stay and time for endoscopy, improved the outcome as cost-effective and most important is the reduction in mortality down to 4.5%, compared with the international figure of 10-20%.

References