

haemophilia, a condition in which it is likely that there is a connective-tissue defect.

The difficulty of manufacturing a suitable knee-joint is another factor militating against this amputation. However, if a through-knee amputation, which is at least 2 in. (5 cm.) lower, can be satisfactorily fitted, it must be possible to accommodate the shorter Gritti-Stokes.

The prosthesis supplied by the Ministry of Pensions is heavy and cumbersome, as is in fact a modified above-knee prosthesis. There is thus no difference in weight, but the additional leverage of the long stump of the Gritti-Stokes amputation may be of advantage to the patient.

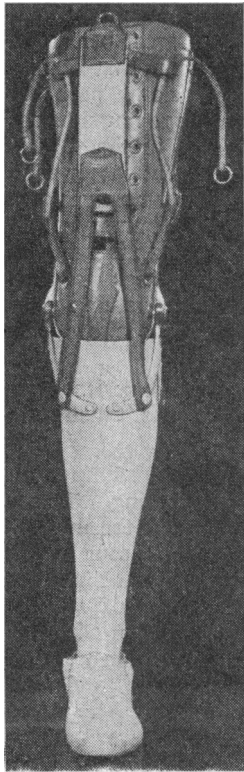


FIG. 3.—Prosthesis given to Gritti-Stokes amputees at the Sunnybrook Hospital, Toronto, Canada.

The prosthesis is partially ischial- and partially end-bearing (Fig. 2), although some of our patients were fitted with a totally ischial-bearing prosthesis. With this prosthesis they were able to walk, but with a locked knee; we have never seen an elderly above-knee amputee walk with a free swinging knee, and such people always require a stick for support.

Harris (1962) fits all his Gritti-Stokes amputees with a different prosthesis (Fig. 3) which is totally end-bearing, and does not require a pelvic band, rotation being controlled by lacing on the thigh. An over-shoulder harness is also used. It would appear to be much superior to the British equivalent.

We have no experience of the through-knee amputation, but it would seem to have certain disadvantages, at least

in theory. The anterior flap must be long and necessarily thin, to cover the bulbous femoral condyles, and the viability of this flap would appear to be precarious in the atherosclerotic patient. If, however, this is not the case it would seem to be the equal of a Gritti-Stokes amputation.

Summary

Twenty-five Gritti-Stokes amputations, the majority in the elderly, have been reviewed, and it is contended that this is a satisfactory operation. It is superior to the standard above-knee amputation in that rapid healing occurs in the majority of cases, mobilization is early, and the stay in hospital is relatively short.

The difficulties of fitting a satisfactory prosthesis have been examined, and it is suggested that a better limb could be made available; with this proviso, which is the major factor against this operation, we believe that a Gritti-Stokes is the best amputation that can be offered to the atherosclerotic patient who must lose a limb.

We thank Professor P. R. Allison and Mr. A. S. Till for permission to operate on and report these cases. We

are also indebted to Dr. D. L. Harbinson, of the Limb Fitting Centre, Reading, for his co-operation.

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SEA-SNAKE ANTIVENENE: SUCCESSFUL TRIAL

BY

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Sea-snakes are a common hazard to fishermen in Asian coastal waters (Reid and Lim, 1957). Unfortunately, land-snake antivenenes do not neutralize sea-snake venom. However, Carey and Wright (1960) showed that experimental antiserum made with venom of the common sea-snake *Enhydria schistosa* (Daudin) was also effective against venoms of other sea-snake species. A refined therapeutic sea-snake antivenene is now made at the Commonwealth Serum Laboratories, Melbourne, Australia, by immunizing horses with *E. schistosa* venom supplied from the Snake and Venom Research Institute, Penang. Shortly after this new antivenene was received in Penang, it was used to treat two victims admitted with severe poisoning.

Case 1

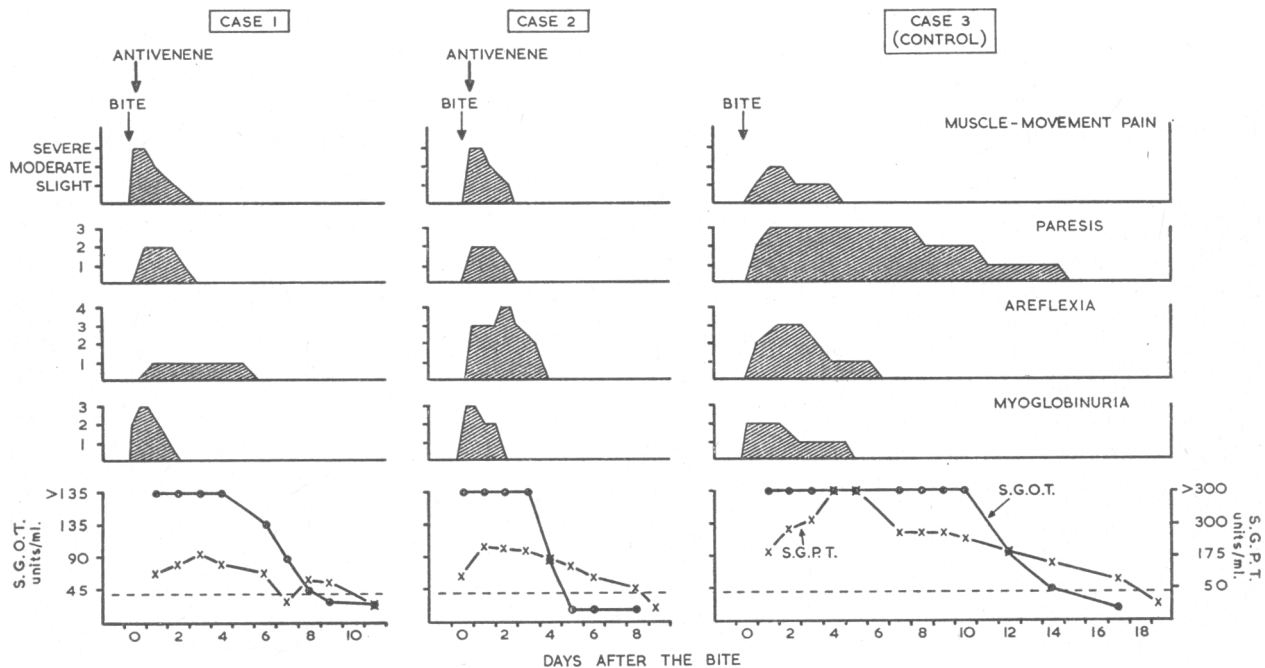
A 16-year-old Malay fisherman trod on a sea-snake as he stepped out of his boat and was bitten on the left foot at 11 a.m. on December 21, 1961. The sea-snake species was not recognized. No first-aid measures were applied. He walked home and at 11.30 a.m. noticed pain in his throat and limbs, and felt thirsty. He cycled to a police station and was eventually transferred to Penang General Hospital, arriving at 2.30 p.m. He already had serious poisoning, with pronounced muscle-movement pains on flexing limbs, neck, and trunk. Facial and jaw movements were also very painful. Muscles were tender on compression. Tendon reflexes were brisk and neurological examination was negative. No paresis was evident (although the patient was reluctant to move on account of the pain it caused). Multiple sea-snake-bite marks were present on the dorsum of the left foot. Blood-pressure (B.P.) was 150/100, heart rate 90. The remaining physical examination revealed nothing of note.

By 3.30 p.m. muscle-movement pains were more severe; B.P. 150/110. There was slight ptosis and he was unable to turn either eye outwards to the full extent. The white-cell count was 18,100/c.mm., and urine—the first passed since the bite—showed the typical brown colour of myoglobinuria (later shown to be spectroscopically positive). It was now evident that he had severe poisoning likely to be fatal by comparison with previous cases (Reid, 1961a, 1961b). There was no reaction to a test subcutaneous injection of 0.5 ml. of sea-snake antivenene given at 4.10 p.m. An

intravenous drip of 100 ml. of antivenene and 400 ml. of normal saline was therefore started at 4.50 p.m. and completed by 6.05 p.m. A mild urticarial rash developed at 6 p.m., but this quickly resolved with intravenous chlorpheniramine 10 mg. (he denied previous antiserum injection or illness suggesting allergy).

At 7.30 p.m. the patient thought muscle-movement pains had diminished in the lower limbs but were unchanged elsewhere. At 9 p.m. the second urine specimen was darker brown than the first. He slept well. At 8.15 a.m. on December 22 general muscle-movement pains were less marked though still present. Head-lifting and hand-grip were weak and tendon reflexes in the upper limbs were depressed. Urine was now paler, indicating diminishing

could easily be distinguished from other teeth marks. Generalized muscle-movement pains were very severe and extensive. Facial, neck, trunk, and proximal limb muscles were particularly affected. Eye movements were full. She was unable (or unwilling) to sit up: knee- and ankle-jerks were not obtained. Urine passed at Sungei Patani Hospital four hours after the bite was brown and positive for occult blood. There was no reaction to a subcutaneous test dose, and at 6.45 p.m. an intravenous drip of 50 ml. of sea-snake antivenene (potency was double that given in Case 1) in 200 ml. of normal saline was started, gradually speeded up as no reaction occurred, and completed by 7.05 p.m. (eight hours after the bite). Four hours later the muscle pains had diminished and she slept well. Subjec-



Clinical course showing rapid recovery after administration of sea-snake antivenene in two severely poisoned patients (Cases 1 and 2). Recovery in Case 3 (no antivenene was given as the patient had only slight poisoning) is by comparison much delayed. Paresis: 3=unable to lift head; 2=unable to sit up spontaneously; 1=objective weakness less than 2. Areflexia: 4=5-6 tendon reflexes absent; 3=3-4 absent; 2=1-2 absent; 1=present but weak. Myoglobinuria: 3=dark brown, red, or black, spectroscopically positive; 2=light brown or dark yellow, spectroscopically positive; 1=benzidine-positive, spectroscopically negative.

myoglobinuria (see Chart). By 4 p.m. he felt normal except for mild muscle-movement pains in the upper limbs, neck, and jaw. Knee-jerks were now sluggish, B.P. 120/95, and T-wave inversion in the electrocardiogram extended to V4. On December 23 slight muscle-movement pain was confined to the upper limbs: next day he felt normal although biceps- and triceps-jerks were still sluggish. On December 27 arm tendon reflexes were normally brisk and clinically he had completely recovered. In the evening of December 30 a mild serum reaction developed with generalized morbilliform rash and enlargement of lymph nodes. He swallowed 10 mg. of chlorpheniramine and the reaction subsided completely within 12 hours.

Case 2

An 8-year-old Chinese girl was bitten on the left mid-leg while bathing in Tanjong Dawai river-mouth (on the Malayan mainland) at 10.45 a.m. on March 18, 1962. On reaching home at 11 a.m. she complained to her mother of pain and stiffness of the jaws. She vomited the anti-snake herbal wine given by the mother. At 11.45 a.m. pains in the neck, back, and limbs started. The species of sea-snake was not recognized, but on the girl's arrival at Penang General Hospital at 5.45 p.m., typical fang marks 12 mm. apart (the width indicates the bite of an adult sea-snake)

tively she had completely recovered 48 hours after the bite (see Chart and Table). She agreed to remain in hospital until April 2: no late serum reaction occurred.

Case 3 (Control Case)

A Malay fisherman aged 16 was bitten at the base of his left thumb while hauling his net into the boat at 4.30 a.m. on March 19 (day after Case 2). He killed the snake and (most exceptionally) brought it to Penang General Hospital. It was a male adult *E. schistosa* 73 cm. long. No first-aid measures were used. About 6 a.m. he felt pains in the back and at 7 a.m. pains in the neck. His father therefore brought him to hospital, where at 8.30 a.m. he had mild muscle-movement pains. At 10.45 a.m. pains in the thighs had become more pronounced but elsewhere were not severe. Compared with the first two cases and with previous patients, he had only slight poisoning. Since the supply of sea-snake antivenene was limited and its effectiveness in human victims still uncertain, it was judged ethical to withhold antivenene and observe the patient as a control case. His subsequent course is illustrated in the Chart and Table. All the clinical features—muscle-movement pains, paresis, areflexia, and myoglobinuria—and the biochemical abnormalities persisted much longer than in Cases 1 and 2. Paresis took two weeks to resolve.

have invariably taken months to recover fully. The improvement following antivenene in these subjects was by comparison dramatic. Clinical recovery took only six days in Case 1 and three days in Case 2, compared with two weeks in Case 3, where the patient had slight poisoning. I conclude that the antivenene—despite the apparent feeble potency as judged by *in vitro* tests—probably saved the patient's life in Case 1 and greatly shortened the duration of morbidity in Case 2. This opinion is reinforced by research in Malayan viper-bites which has shown that a theoretically feeble specific antivenene is most effective in systemic poisoning (statistically the results are highly significant). The customary potency tests of specific antivenene in small animals may not necessarily reflect therapeutic effectiveness in human victims.

The biochemical studies confirm the salutary effects of antivenene. The marked elevation of S.G.O.T. would be anticipated, being due to release of the enzyme from skeletal muscle damage prior to antivenene administration. Pearson, Beck, and Blahd (1957) record similar changes in idiopathic myoglobinuria. The rise in S.G.P.T. reflects liver damage. The rapid return of these enzyme levels to normal in Cases 1 and 2 indicates that the myotoxic and hepatotoxic venom factors were effectively neutralized by the antivenene. In all three cases S.G.O.T. exceeded 135 units/ml. at the first estimation, which in Case 2 was only seven hours after the bite. S.G.O.T. is a sensitive confirmatory test of sea-snake-bite poisoning, but it does not necessarily reflect the severity of the lesions. In a recent case of sea-snake bite with very trivial poisoning the S.G.O.T. exceeded 135 units/ml. Numerous granular casts and some erythrocytes in the early urine specimens indicate serious kidney damage, which may explain the early sustained hypertension. These features had resolved in Case 1 30 hours after the antivenene administration. But the subsequent elevation of blood urea in Case 3 suggests that if antivenene is not given nephropathy may follow even in slight poisoning. The E.C.G. abnormalities in Case 1 were not those usually attributed to electrolyte abnormalities (Goodwin, 1958). E.C.G. changes, particularly in right chest leads, are common in severe sea-snake-bite poisoning (Reid, 1961a) although clinical, radiological, and pathological evidence of direct cardiovascular damage is conspicuously absent (Marsden and Reid, 1961).

The potency of subsequent sea-snake antivenene from the Commonwealth Serum Laboratories will be at least twice that of the second trial antivenene. What are the indications for using it? Less than one-fifth of human victims bitten by sea-snakes develop serious poisoning. Thus in 56 patients admitted under my care during 1957-61 following unequivocal sea-snake bite no poisoning followed in 41 (73%); poisoning was trivial in 5 (9%), severe in 5, and fatal in 5. If probable and doubtful cases of sea-snake bite were included, the proportion with serious poisoning would be lower than 20%. Antivenene is required *only* in this small minority. One of the most gratifying aspects of these trial cases is the fact that antivenene was successful although not given until seven to eight hours after the bite. It is therefore not only safe but very desirable to wait until there is clear evidence of poisoning before giving the sea-snake antivenene. For example, if a victim is seen within one hour of being bitten, before symptoms of poisoning may have developed, or if the patient presents with an effective tourniquet applied

(Reid, 1961b), a placebo injection should be given and the patient kept under observation, the tourniquet having been removed in the latter case. If significant poisoning symptoms do not ensue during the next hour, antivenene is *not* indicated. In the minority needing antivenene intravenous drip route is mandatory: but again it is safe to delay administration 30 minutes after a subcutaneous test dose to exclude sensitivity. Furthermore, it should be possible to desensitize a sensitive subject by graded-dose technique culminating in an effective intravenous neutralizing dose.

Summary

A new sea-snake antivenene (the first refined therapeutic sea-snake antivenene to be made) was given to two patients with severe sea-snake-bite poisoning. In one case this was likely—by comparison with previous cases—to have been fatal. Recovery of both patients was dramatic. A third patient, not given antivenene since he had only slight poisoning, took two weeks to recover.

Potency tests in small animals may not necessarily reflect therapeutic effectiveness of specific antivenene in human snake-bite poisoning.

Although serum enzymes are a sensitive and useful guide to sea-snake-bite poisoning, clinical observation is more reliable in detecting the small minority of sea-snake-bite victims who require the antivenene. Increasing generalized myalgia and myoglobinuria are the indications for sea-snake antivenene, and administration can be safely delayed until these signs are clearly evident.

I wish to thank many members of the Commonwealth Serum Laboratories for their interest and for the production of the sea-snake antivenene; Dr. T. M. Chin for his help with the patients; Mr. K. E. Calderbank for the spectroscopy; Dr. K. E. Chan, Dr. J. K. Lucas, and Dr. M. Osman for the biochemical investigations; and the patients for staying in hospital many days after full recovery, to enable follow-up studies to be made.

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The handbook, issued by the British Council and compiled from official sources, *Scientific and Learned Societies of Great Britain*, is the fourth of its kind and derives from the *Yearbook of Scientific and Learned Societies*, which had appeared almost continuously for over 50 years before the war stopped publication in 1939. Part I lists the principal Government organizations and public bodies with research divisions, other than university departments, and technical colleges, and includes a select bibliography on the organization of research in the same field. Part II includes particulars of individual societies. Correspondence about errors and omissions should be sent to the Director, Publications Department, The British Council, Albion House, 59 New Oxford Street, London W.C.1. (Published by George Allen and Unwin, 1962; price 45s. net.)