

Diabetic foot infections in Tonga

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Introduction

In Tonga there has been an increase in non-communicable diseases such as diabetes and ischaemic heart disease, providing a major challenge to those working in public health and in preventative medicine¹. This reflects a similar pattern across the Pacific region and the problem threatens to be an overwhelming burden in the next two decades².

Diabetes mellitus Type 2 is the type most commonly seen in Tonga³. It is anticipated that results from a survey of diabetic screening in October 1998 will provide the most reliable figures for the prevalence of the disease. Sepsis is one of the commonest presenting complaints amongst diabetics in this country, and therefore is a useful marker in assessing the extent of the problem.

Methods

Data was extracted from the Operating Theatre records for the period 1992 to 1996. Only those having lower limb debridement or amputation who were known to be diabetic were included, and this was verified with the patients' medical records. Each operation was recorded as a separate event, although many patients underwent more than one procedure.

Results

For this five year period, there were 280 debridements, 30 minor amputations, and 45 major amputations among diabetics. This represents an average of over one procedure per week. The trend was unchanged in the subsequent two years, with 1998 figures of 13 major amputations and one death from gangrene affecting an entire limb.

Discussion

The diabetic foot is predisposed to infection and necrosis through several factors⁴. Ischaemia, which is largely due to microangiopathy, results in an inability to heal small wounds, an anaerobic environment which favours certain organisms, and a reduced inflammatory response. Neuropathy causes loss of pain sensation and also results in clawing deformities from small muscle paralysis and neuropathic joint degeneration, with subsequent pressure on toes and metatarsal heads. Infection is encouraged by hyperglycaemia and altered polymorph function. It has been suggested that neuropathy and micro-angiopathy do develop more rapidly in diabetics when their glucose levels are poorly controlled.

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With the stage set for infection and necrosis, all that is required is a minor injury. In Tonga, many people use little or no footwear and they walk on rough road edges or stony paths which are shared with pigs and other animals. Sitting cross-legged on the floor for long periods of time leads to ischaemic damage to lateral toes, foot and ankle.

Delayed presentation allows the infection to spread alarmingly and may result from a number of factors such as lack of health education, geographic isolation, reliance on "fai'o fakaTonga" (traditional Tongan medicine), and the "Tongan warrior mentality". The latter refers to the stoic endurance of a person who is willing to ignore his or her own physical complaint in favour of fulfilling a family or social obligation. Another factor is the inappropriate treatment with antibiotics when surgical debridement or drainage is required.

The first problem will be an increase in atherosclerosis due to lifestyle changes such as smoking and high fat diet,

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Table 1. Lower limb amputations, 1992-1996

Year	BKA / AKA	Single toe amp'n	More than 1 toe amp'n
1992	10	4	4
1993	4	6	0
1994	6	5	3
1995	15	4	0
1996	10	4	0
Total	45	23	7

Note: BKA = below-knee amputation, AKA = above-knee amputation

in combination with the already established factors of obesity, diabetes and hypertension^{1,3}. This will lead to more lower limb ischaemia due to combined large and small vessel disease.

Secondly, we are likely to see the emergence of resistant organisms. Currently, most of the infected diabetic feet in Tonga grow sensitive *Staphylococcus aureus* and Gram negative organisms. (Anaerobes cannot be cultured in our present laboratory) Infection control practices will need to be dramatically improved, and expensive drugs such as Vancomycin have been unavailable or donated as expired batches.

There is an increasing demand for containment of hospital costs. Diabetics are a large burden with prolonged nursing-intensive admissions, occupying on average 7 of our 33 surgical ward beds. Development of community nursing services would help with this problem and would also protect against in-hospital cross infection.

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Surgical approach

An excellent and extremely thorough description of the management of the diabetic foot can be found in the work by Ian Faris⁴. Antibiotics are ineffective against gangrenous tissue and collections of pus. Their place is in the treatment of cellulitis, septicaemia (systemic signs) and the prevention of post-operative infection. Attention must be given to control of serum glucose levels and to the renal and cardiac complications of diabetes, if present. Xrays are obtained to identify osteomyelitis or gas gangrene. Pulse are assessed even though occlusive large vessel disease is unusual in Tonga.

The surgeon should aim to perform the minimum number of procedures rather than multiple piecemeal incomplete debridements. An initial local debridement to remove all necrotic tissue and drain pockets of pus is a reasonable approach. The tissues should be opened widely, removing overlying skin if necessary. There is no place for small incisions or drain tubes which result in persisting sinuses and more operations. The wound is left open and packed with saline-soaked gauze. Later, other dressings such as calcium alginate may be used, but these are rarely available in Tonga.

The first dressing change will reveal the adequacy of the initial debridement. This can be difficult to assess at the time of surgery if there is much inflammatory bleeding. The next procedure should be planned and definitive.

An infection which begins on the plantar aspect of the metatarsal head or at a metatarsophalangeal joint will tend to track proximally along flexor tendon sheaths, and is best treated by a "ray" amputation. That is, removal of the toe and distal metatarsal via a longitudinal incision through the sole of the foot.

A single gangrenous toe may be treated by amputation of the toe alone, but if discharge of pus persists, a ray amputation may be required. Also, the infection may involve adjacent toes via the web space or by tracking under the plantar skin of the foot. This situation is often best treated by a transmetatarsal amputation of the distal foot (ie. removal of all five toes and metatarsal heads). There is no point leaving 2 or 3 toes which will have little functional benefit and will be susceptible to further injury.

Extensive debridement of the sole of the foot including several tendons, or the finding of boggy tissue behind the medial malleolus are situations which indicate that a below-knee amputation will probably be required. The decision

should be made early before the tissues of the calf become involved, otherwise an above-knee amputation may be necessary. Rehabilitation of these patients brings further difficulties, but delaying the decision to amputate makes matters worse and can have dire consequences.

Conclusion

The future of surgery across the Pacific holds an abundance of challenges including the management of the complications of rapidly emerging Western diseases. Education and prevention must take local culture and values into account, and strategies should continue to include the specific relevant training of local health professionals.

Reference

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Any fool can cut off a leg - it takes a surgeon to save one.

G. G. Ross 1834 - 1892