THE USE OF A TOURNIQUET WHEN PLATING TIBIAL FRACTURES

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Sixty closed fractures of the tibia were treated by open reduction and internal fixation with plates and screws. Half the operations were performed with a thigh tourniquet and half without. In the tourniquet group, there were six cases with erythema and induration of the wound; in the other group there were no such complications. Despite negative bacterial cultures, superficial infection of the inflamed wounds was suspected.

It is suggested that a tourniquet may predispose tissues to infection, and its use is not recommended during operations for internal fixation of the tibia.

The bloodless field obtained by the use of a tourniquet has obvious benefits to the surgeon. However, the compression of the limb beneath the cuff, and the ischaemia distal to it, may have ill effects on the limb.

To assess the morbidity of lower limb ischaemia from the use of a tourniquet, 60 closed tibial fractures, all treated by internal fixation, were studied prospectively.

METHODS AND MATERIALS

From January 1987 to January 1989, 60 patients with closed tibial fractures underwent open reduction and internal fixation (ORIF).

The patients were randomly allocated into two groups;

Group A. Thirty patients who had ORIF with the use of a thigh tourniquet inflated to twice the systolic blood pressure (Klenerman and Hulands 1979).

Group B. Thirty patients who had ORIF without a tourniquet. Bleeding was controlled by diathermy cauterisation.

The patients were aged between 18 and 50 years (mean 32.2); there were 27 men and three women in group A, 26 men and four women in group B. All fractures were caused by low-velocity injuries from sports

trauma or falls. There was a similar distribution of fracture site and type in both groups.

All were treated by one author (AAS) using an AO plate and screws. A suction drain was implanted at the end of the procedure. The limbs were dressed with cotton wool and crepe bandages, and a below-knee plaster cast was applied after 48 hours of bed rest and elevation. The patients were seen daily until their discharge from hospital.

RESULTS

The two groups did not differ with respect to blood loss, operation time or technical difficulties and all the fractures united.

In group A, six patients developed pain which required removal of the plaster cast. Three patients, inspected within the first week, had inflamed and indurated wounds. Bacterial cultures were sterile but the wounds were nevertheless diagnosed as having superficial infections and treated with bed rest, elevation and antibiotics.

Three further patients developed similar symptoms three weeks after operation. Their wounds were all healed but the skin was indurated and inflamed. These patients were afebrile and had normal white cell counts and blood sedimentation rates. The inflammation settled with bed rest and elevation after plaster removal.

No similar problems were seen in group B.

DISCUSSION

Since its introduction in 1718 by Petit, the tourniquet has been extensively used in orthopaedic practice to achieve a bloodless field and thereby facilitate surgery (Klenerman et al 1980). However, the authors propose that the

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surgeon operating on the tibia should avoid using a tourniquet, where possible, for the following reasons:

- 1) the drilling of bone may cause higher temperatures in a bloodless field because of the lack of the cooling effect of circulating blood;
- 2) with a tourniquet, tissue dehydration may occur from the drying effect of theatre lamps;
- 3) without a tourniquet, it is easier to identify blood vessels;
- 4) without a tourniquet, there is no time restriction to the operation; and
- 5) after tourniquet removal there are considerable changes in the dimension of the limb. Silver et al (1986) reported a 10% increase in limb size within 50 minutes of tourniquet removal. This may be due to reactive hyperaemia, postoperative haematoma, or postanoxic oedema. This degree of reactive hyperaemia increases with the tourniquet time (Holden 1979). The swelling can cause tension at the suture line and ischaemia of previously dehydrated tissues.

Conclusion. Our experience suggests that the bloodless field achieved by the use of a tourniquet may predispose to low-grade wound infection. Tibial fractures should be reduced and plated without a tourniquet.

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REFERENCES

- Holden CEA.** The pathology and prevention of Volkmann's ischaemic contracture. *J Bone Joint Surg [Br]* 1979; 61-B:296-300.
- Klenerman L, Hulands GH.** Tourniquet pressures for the lower limb. *J Bone Joint Surg [Br]* 1979; 61-B:124.
- Klenerman L, Biswas M, Hulands GH, Rhodes AM.** Systemic and local effects of the application of a tourniquet. *J Bone Joint Surg [Br]* 1980; 62-B:385-8.
- Silver R, de la Garza J, Rang M, Koreska J.** Limb swelling after release of a tourniquet. *Clin Orthop* 1986; 206:86-9.