

Immediate primary skin closure in type-III A and B open fractures

RESULTS AFTER A MINIMUM OF FIVE YEARS

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Between June 1999 and May 2003 we undertook direct primary closure of the skin wounds of 173 patients with Gustilo and Anderson grade-IIIA and grade-IIIB open fractures. These patients were selected from a consecutive group of 557 with type-III injuries presenting during this time. Strict criteria for inclusion in the study included debridement within 12 hours of injury, no sewage or organic contamination, no skin loss either primarily or secondarily during debridement, a Ganga Hospital open injury skin score of 1 or 2 with a total score of ten or less, the presence of bleeding skin margins, the ability to approximate wound edges without tension and the absence of peripheral vascular disease. In addition, patients with polytrauma were excluded.

At a mean follow-up of 6.2 years (5 to 7), the outcome was excellent in 150 (86.7%), good in 11 (6.4%) and poor in 12 (6.9%). A total of 33 complications occurred in 23 patients including superficial infection in 11, deep infection in five and the requirement for a secondary skin flap in three. Six patients developed nonunion requiring further surgery, one of whom declined additional measures to treat an established infected nonunion.

Immediate skin closure when performed selectively with the above indications proved to be a safe procedure.

Debate continues on the timing of closure in open fractures particularly on the role of immediate closure in Gustilo and Anderson type-III injuries.¹⁻⁷ The common practice of leaving wounds open after debridement⁸⁻¹² was based on the experience of war wounds during a period when antibiotics were less readily available, the principles of surgical debridement were not fully developed and the techniques for proper soft-tissue reconstruction had not been established.^{13,14} With the availability of potent antibiotics and refinement in the techniques of surgical debridement, surgeons have slowly advanced towards early and even immediate closure of the wound.^{1-3,15-24}

The major concern with immediate closure is the increased risk of infection on the premise that the offending organism leading to infection in open injuries is introduced at the site of the accident. However, there is ample evidence that infection is generally the result of hospital acquired colonisation rather than primary contamination at the time of injury.²⁴⁻²⁸ It has been shown that there is no correlation between contaminating organisms and those isolated in subsequent infection. Pre-operative cultures rarely grow drug-resistant organisms which

are often found in infected open injuries.²⁷ The rate of infection may in fact be greater in wounds which are left open in the hospital environment for closure at a later date.²⁴ Leaving wounds open may also lead to avoidable desiccation of the tissues resulting in increased secondary loss of tissue, an increase in the number of surgical procedures required, a lengthened in-patient stay and extra cost.

There is growing interest in the possibility of primary closure in open injuries.^{1-3,15-24} However, studies on this subject have included a wide variation in wound management such as direct skin closure, skin grafting and early application of skin flaps.²⁸ No study has evaluated the long-term results of direct skin suturing performed immediately in type-III injuries or the appropriate indications for this approach.

It has been our practice since 1992 to perform immediate skin closure of open injuries, including type-III injuries, during the initial reconstruction, if certain criteria were met. The encouraging results achieved prompted us to carry out a prospective study on the outcome of the immediate closure of type-III injuries and to develop safe indications for the procedure.

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©2009 British Editorial Society of Bone and Joint Surgery
doi:10.1302/0301-620X.91B2.21228 \$2.00

J Bone Joint Surg [Br]
2009;91-B:217-24.
Received 28 April 2008;
Accepted after revision 26 September 2008