

CASE REPORTS

The calcaneum as a site for intraosseous infusion

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Abstract

Intraosseous infusion has been recommended as a rapid and effective form of circulatory access in the collapsed child. Recognised sites for insertion include the tibia, femur, iliac crest, sternum, and clavicle. The case of a 3 year old collapsed child is described who was successfully resuscitated with the use of an intraosseous needle placed in the calcaneum; the method of needle insertion is also detailed.

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Case report

A 3 year old boy was brought by ambulance to our accident and emergency (A&E) department with rapidly progressing circulatory collapse as part of a clinical picture consistent with meningococcal septicaemia. Aggressive resuscitation was started in accordance with Advanced Paediatric Life Support guidelines, under the direction of consultants in A&E medicine, paediatrics, and intensive care medicine. Predictable difficulties with venous access were encountered and it was soon decided to attempt intraosseous access in the proximal tibia. For reasons that are unclear, this proved impossible (the needles bent on a number of occasions when cortical penetration was attempted). Central access was attempted via the femoral veins, but proved difficult, presumably due to the degree of circulatory collapse. One of the authors successfully inserted an intraosseous needle into the medial aspect of the calcaneum.

Over the next six hours, 1800 ml of fluid were infused through the calcaneal needle and other appropriate resuscitative measures instituted. The needle was removed by one of the authors when no longer required after six hours and the site treated with standard dressings. The child went on to make a full recovery and the calcaneal needle site healed without complication. Follow up over six months has

shown him to be continuing to develop normally.

Discussion

It is recommended that the intraosseous route of infusion is used when emergent venous access is required in a child less than 6 years of age with a life threatening condition in whom venous access has not been achieved within two minutes of the first attempt.¹ The proximal tibia is the preferred site. Other recommended sites include the distal femur, iliac crest, sternum, and clavicle. These sites can be difficult to access in a small child with several large adults involved in resuscitation. To the best of our knowledge, the calcaneum has never been described as a possible site for intraosseous needle insertion.

The calcaneum is a completely cancellous bone beneath its cortex and would not ordinarily appear to fulfil the requirement of a functioning marrow cavity for intraosseous infusion. However, our experience of successful resuscitation, with flow rates via the calcaneal needle that matched those we would have anticipated via a properly placed tibial needle, suggests it is a possible site when desperate measures are required. In small children, its distal site allows for the procedure to be carried out without impeding access to the child for resuscitative measures aimed at controlling airway and ventilation.

In terms of technique, we would recommend the medial aspect of the calcaneum because this can be accessed easily with external rotation/abduction of the ipsilateral hip and slight flexion of the ipsilateral knee and the bone is immediately subcutaneous here. It is necessary to avoid the epiphyseal plate posteriorly and posterior tibial vessels anterosuperiorly as they pass below the medial malleolus. Technique of insertion and subsequent management is the same as for other sites of intraosseous access.

1 Evans RJ, Mc Cabe M, Thomas R. Intraosseous infusion. *Br J Hosp Med* 1994;51:161-4.

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