



Case report

A COMPLICATION OF THE USE OF
AN INTRA-OSSEOUS NEEDLE

Abstract

Intraosseous needles provide an important alternative to intravenous access for administration of drugs, fluids and blood products in the emergency management of trauma patients. This case report highlights one potential complication of the use of one brand of IO needle.

Introduction

The use of intra-osseous (IO) needles as a method of providing access for the infusion of fluids and drugs in military trauma patients has become increasingly established. Needles can be inserted either pre-hospital or in the emergency department and allow the rapid infusion of fluids, blood products and drugs in the severely injured patient. We present a case of breakage of an intra-osseous needle in situ and the difficulties in removal and discuss the lessons learnt from this.

Case Report

A 21 year old soldier serving in Afghanistan sustained multiple soft tissue fragmentation injuries to his left arm, forearm, buttock, thigh and leg as well as injuries to his right leg and heel. There were no neurovascular or bony injuries. During his initial pre-hospital treatment he had an intra-osseous needle inserted into his manubrium sternum. After arrival in the emergency department and intra-venous access had been secured, an unsuccessful attempt was made to remove the intra-osseous needle using the 'extraducer' provided with the IO needle kit. He was taken the same day to theatre for debridement of his wounds where a further unsuccessful attempt was made to remove the retained end of the needle.



Figure 1 Incision over the palpable needle tip; the marks from the introducer are to the left of the inferior retractor (Blue arrow).

He was repatriated to our unit in UK 24 hours later and returned to theatre at 48 hours post-injury for reassessment of his wounds. Because of the risks of infective complications associated with a retained foreign body in a subcutaneous bone, another attempt at removal was discussed with the patient and was undertaken under the same general anaesthetic. The needle end was palpable in his manubrium however it was noted to be situated inferiorly and toward the midline in relation to the skin marks made by the needle introducer. A separate incision was made over the palpable needle tip (Figure 1) which was removed intact (Figure 2). The patient made an uneventful recovery.

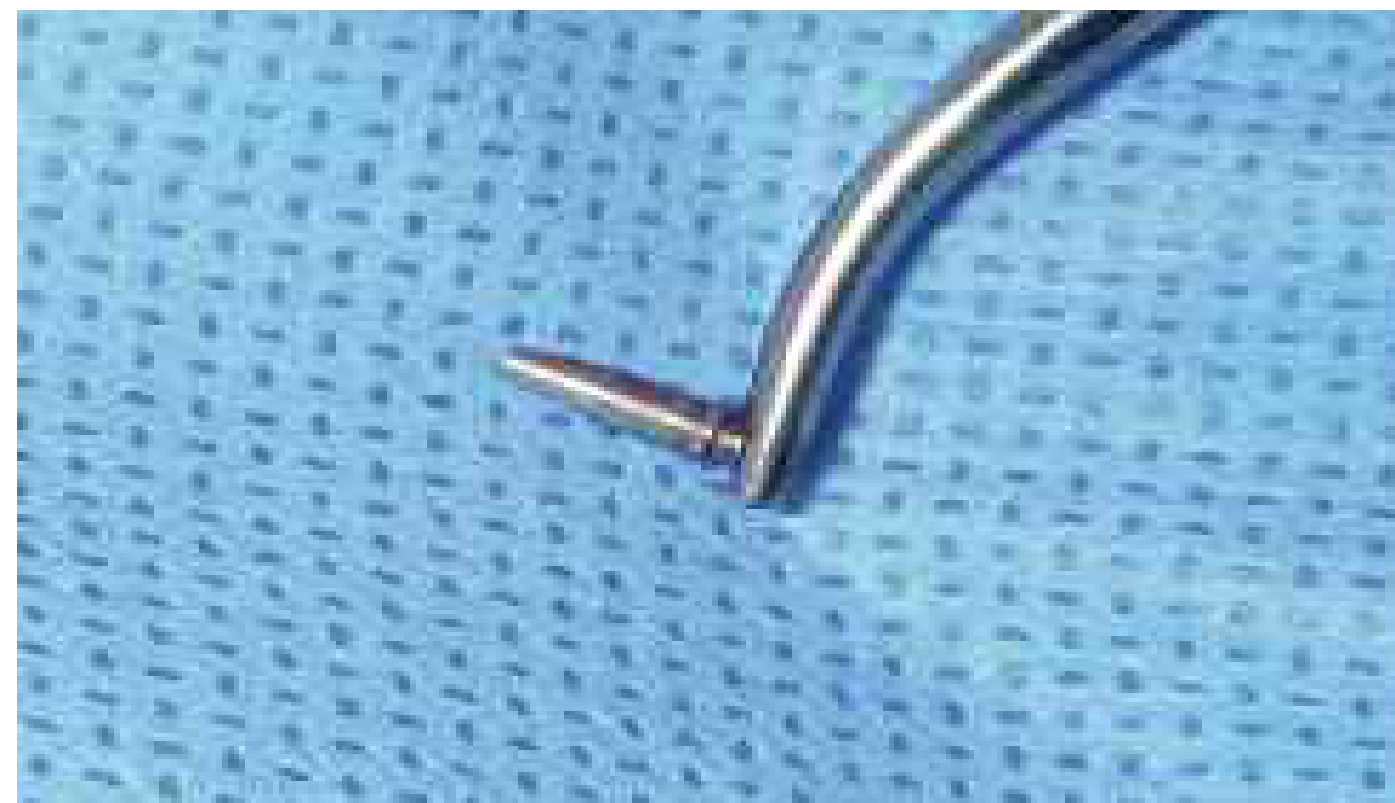


Figure 2. The retrieved needle tip.

Discussion

Intra-osseous needles allow rapid access and infusion of fluids, drugs and blood products. Cooper et al report a 97% effective function in 32 needles inserted in 26 patients with 3 needles inserted in the pre-hospital setting [1]. Suyama et al found that vascular access was achieved faster using intra-osseous rather than intravenous needles especially when the provider and patient are wearing personal protective equipment [2]. A number of complications have been described following intra-osseous infusion. Infection can take the form of cellulitis or in more severe cases osteomyelitis [3]. When the tibia is used as an IO access site extravasation of fluid can lead to compartment syndrome which may go undetected in the obtunded patient [4]. In our patient the position of the retained needle tip was distant to the marks made by the introducer in the skin. We suggest this occurred because the needle was introduced when the patient was lying in a lateral position with the skin over the manubrium displaced away from the midline. This resulted in shearing of the needle tip when removal was attempted. Ultimately it led to the necessity for the needle tip to be removed in theatre through a separate incision.

A variety of designs of IO needle are available. Insertion techniques vary from those inserted with simple manual pressure (eg Disposable Intraosseous Needle, Cook Medical, Bloomington, USA), to needles with threaded tips for screw insertion (eg Sur-Fast®, CookMedical, Bloomington, USA) and devices with automated drivers which insert the needle to a set depth (eg EZ-IO®, Vidacare, San Antonio, USA). The device used in this case was a FAST-1® (Pyng Medical Corporation, Richmond, Canada). It consists of a T-shaped handle and a central intraosseous needle surrounded by a ring of smaller needles which allow equal pressure around the central needle thereby guiding a perpendicular insertion into the manubrium.

This design needs a removal tool to be inserted down the infusion tube to engage with the needle prior to removal. Overtightening of the needle or damage through eccentric insertion can cause fracture of the tip on attempted removal. This original FAST-1 system has since been modified so that no removal tool is required and the infusion tubes can be pulled out at the point of insertion in the manubrium. The original design used in this patient has since been withdrawn from use in the UK military and replaced with the new design. A further modification of the design is currently planned. Obtaining vascular access in emergency situations can be a stressful undertaking often performed in suboptimal conditions. Despite this we suggest that where possible attention should be paid to the position of the patient and care taken to avoid tension in the skin before inserting intra-osseous needles in the sternum.

References

1. Cooper BR, Mahoney PF, Hodgetts TJ, Mellor A. Intra-osseous access (EZ-IO) for resuscitation: UK military combat experience. *J R Army Med Corps* 2007; 153(4): 314-6
2. Suyama J, Knutsen CC, Northington WE, Hahn M, Hostler D. IO versus IV access while wearing personal protective equipment in a HazMat scenario. *Prehosp Emerg Care* 2007; 11(4): 467-72.
3. Rosovsky M, Fitzpatrick M, Goldfarb CR, Finestone H. Bilateral osteomyelitis due to intraosseous infusion: Case report and review of the English language literature. *Paediatr Radiol* 1994; 24(1): 72-3
4. Galpin RD, Kronck JB, Willis RB, Frerwen TC. Bilateral lower extremity compartment syndromes secondary to intraosseous fluid resuscitation. *J Pediatr Orthop* 1991; 11(6): 773-6



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