

An Unusual Complication of Intraosseous Needle Use

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Abstract

Intraosseous (IO) needles are extremely useful tools to gain urgent access to the circulation when more conventional routes are unavailable or unsuccessful. As with any medical procedure, complications can occur. We review the indications for IO usage and illustrate an unusual complication of continued serous drainage following IO needle removal. The drainage was significant enough to require use of a drainage bag. This chronically ill patient developed septic shock, multi-system organ failure, renal failure and a high catabolic state. As he did not fully tolerate enteric tube feeds, it was not possible to maintain adequate serum albumin. The resultant lower colloid oncotic pressure contributed to the chronic serous leak from the IO site. Avoidance of such a complication relies on proper IO placement and the ability to maintain adequate nutrition to maintain plasma oncotic pressure. Other complications of IO use are reviewed.

Keywords: Intraosseous needle; Complications of intraosseous use; Intravenous access

Introduction

Intraosseous (IO) needles were developed for urgent circumstances where intravenous (IV) access is needed but may be difficult to achieve due to a variety of factors. Obtaining IV access in the pre-hospital setting can often be a problem where environmental factors include cramped quarters, poor lighting or a moving platform of transportation [1, 2]. In both pre-hospital and hospital locations, individual patient factors can also contribute, such as poor venous access or anatomy, a history of

IV drug use or morbid obesity. Clinical factors such as peripheral vasoconstriction in patients in shock or in hypothermic patients, or burn victims can also make IV access challenging. Victims of major trauma, out-of-hospital cardiac arrest or sepsis may require immediate vascular access.

Drinker et al first described IO infusion in 1922 [3]. In this vascular access technique, the marrow of a mammalian bone becomes a “non-collapsible vein” into which fluids can be infused. Although it became popular in the United States in the 1940s for battlefield resuscitation [4], its use declined with the improvement in IV devices and increased practitioner IV skill [5]. IO was rediscovered in the 1980s and is now the preferred avenue of access when a peripheral IV cannot be readily established [6]. It is a reliable method for administering drugs, fluid and blood. Complications are rare and most often not significant.

Case Report

We report a case where appropriate IO use unfortunately subsequently led to a chronic serous leak from the puncture site in the patient’s right tibia. Patient was a 67-year-old male with a past medical history of hypertension, adult onset diabetes mellitus, hyperlipidemia and end stage renal disease. He was status post a deceased donor renal transplant 4 months previously. One month post-operatively, he was admitted for a right common femoral DVT and placed on coumadin. He was later followed up in clinic. On this admission, patient presented with an elevated creatinine, hydronephrosis, allograft dysfunction and a supratherapeutic international normalized ratio of 12. After his coagulopathy was partially corrected, he underwent a cystoscopy. Urine and blood cultures grew coagulase negative *Staphylococcus*. Eleven days after admission, patient became hypotensive with a systolic blood pressure in the 80s, and a sinus tachycardia of 140. He also complained of shortness of breath, and pulse oximetry saturation decreased. He was endotracheally intubated with cricoid pressure; however, feculent fluid was noted in the oropharynx and likely aspirated. Attempts were made to gain central venous access, but were initially unsuccessful. Thus an IO needle was urgently placed by an experienced operator in the right tibia for resuscitation. Broad spectrum antibiotics were started, immunosuppression medications were held and stress dose steroids were given. In

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Figure 1. Drainage bag over previous IO needle site.

the subsequent hospital course he developed septic shock, and was treated with vasopressors, fluid resuscitation, mechanical ventilation and antibiotics. Cultures grew out resistant *Enterobacter cloacae*. Patient developed renal failure and was placed on continuous veno-venous hemofiltration. He developed continuous serous drainage from the IO site after the needle was removed. This clear straw-colored fluid was collected using a drainage bag (Fig. 1).

Patient's overall predicted mortality risk was > 95% using Acute Physiology and Chronic Health Evaluation (APACHE) scoring. He went on to develop worsening multi-system organ failure (MSOF). Ultimately, his family withdrew support and patient died.

Discussion

This is a novel complication of IO use involving chronic serous drainage from the puncture site. Avoidance of such a complication relies on proper IO placement and the ability to maintain adequate nutrition to maintain plasma oncotic pressure. This chronically ill patient developed septic shock, MSOF, renal failure and a high catabolic state. As he did not fully tolerate enteric tube feeds, it was not possible to maintain adequate serum albumin. The resultant lower colloid oncotic pressure contributed to the chronic serous leak from the IO site.

Many different complications are reported with IO use. Breaking the IO needle was described by Danz et al [7]. Fractures of the bone pierced by the needle have been reported [8, 9]. Bilateral tibial fractures have also been reported [10]. Even sternal perforation and hemomediastinum have been reported after IO placement in the sternum [11]. However, the most common complication of IO use is extravasation. Simmons et al report two cases of extravasation, one leading to a compartment syndrome [12]. If IO extravasation is more severe, compartment syndrome has been described [13]. Unrecognized compartment syndrome has led to eventual amputation [14].

Conclusion

In this report, we reviewed the indications for IO usage. Other complications of IO use are reviewed. We report a novel complication of IO use involving chronic serous drainage from the puncture site. Avoidance of such a complication relies on proper IO placement and the ability to provide adequate nutrition to maintain plasma oncotic pressure.

Conflict of Interest

Authors have no disclosures or conflicts of interest.

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