



Intaraosseus route of infusions in adult patients. An alternative for a difficult intravenous access

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Abstract

Study presents the outcomes of intraosseus infusion in adult patients. 21 selected patients rescued by a medical helicopter crew required establishing IO infusion line.

The reason was inability of achieving IV line. The patients conditions required immediate administration of medications and fluids.

IO access is technically easy and has small misplacement rate. All of established lines gave effective flow of fluids.

Positive effect of medications was reported in 12 cases.

Key words: Intraosseus acces (IO), Intravenous access (IV), Bone Injection Gun (B.I.G), Emergency Medical Services (EMS)

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INTRODUCTION

Intraosseus route of infusion (IO) is a well known alternative for intravenous access in prehospital conditions. For almost 20 years it is widely accepted in pediatric advanced life support procedures.

Current experience presents that IO route might be useful in older children and adults as well.

Several methods of gaining intraosseus access in adult patient are in use. Among different types of devices the most known are Bone Injection Gun (B.I.G), FAST and EZ-IO.

Usually the access point is tibial tuberosity, however other long bones as well as sternum or iliac crest are effective locations.

The only contraindications are the fractures of the bone structure and vascular damage of the limb. In such cases an alternative location on another limb or accessible bone must be searched for.

Intraosseus route of infusion is valuable for all medications and fluids used in emergency medical prehospital procedures.

Unfortunately the role of this route of drug administration is still underestimated in most of the European Emergency Medical Services protocols. The main disadvantage of IO equipment is high cost of devices and training kits.

MATERIAL

21 cases of IO use in prehospital environment were analyzed. The study included cases of IO access provided by helicopter medical crew of Tatra Mountain Rescue Service and Helicopter Emergency Medical Service in Krakow.

In the period 2004-2006 there were 29 cases of intraosseus access in those services.

Only adult patients (over 15 years of age) were included into the study. In all of the cases access was provided using Bone Injection Gun (B.I.G). The injection site was tibial tuberosity.

Bone Injection Guns were inserted by qualified medical helicopter team members (doctors or paramedics). Medical records of HEMS teams were analyzed. They included patient's data, primary diagnosis and medical procedures (including attempts of achieving IV line), administered medications.

RESULTS

Among 21 cases there were 18 males (85,8%) and 3 (14,2%) female patients.

The mean age of the patients was 40,8 years (range 16-77). 10 of them were less than 35 years old.

In all of the cases there were at least 3 unsuccessful attempts of gaining peripheral IV access.

In 19 cases (90,4%) IO access was achieved during first attempt. In two cases there was a needle misplacement and the access was gained in the second attempt.

10 of the patients had severe trauma, 7 severe burns, 2 hemorrhage from digestive tract, 2 other medical conditions.

10 of the patients were in cardiac arrest.

All infusion lines allowed a free flow; crystalloids and medications were thus administered.

9 of patients (42,8%) died before reaching Emergency Department.

Medical records confirmed effective drug and fluid infusion by reaching sedation, pain reduction, anti arrhythmic effect and fluid resuscitation in 12 cases.

DISCUSSION

IO access is a well known method giving safe alternative for difficult vascular access.

In certain situations time of drug and fluids administration is critical and needs to be achieved primarily for patient's stabilization. Some of the protocols suggest performing IO access in adult patients after 3 unsuccessful IV attempts. In pediatric patients IO is accepted as an IV alternative in first attempt.

In analyzed group IO access was achieved by experienced HEMS crew members. They have large experience in setting IV lines under different conditions, IO became "last defense line".

Needles were inserted using Bone Injection Guns (Adult). In all of the cases the injection point was tibial tuberosity. It seems to be the most accessible and technically easy location. None of the cases required alternative locations.

Only in 2 cases there was needle misplacement in first attempt. In both cases, access was achieved in second attempt.

17 (80,9%) of the cases were severe trauma or severe burn patients. It is a commonly experienced problem in achieving fast and effective IV line in hypovolemic shock or in severely burned patients.

There were 10 cases of cardiac arrest. 7 of them resulted from trauma mechanisms.

8 of them were result of Pulsless Electrical Activity (PEA), IO became critical solution for epinephrine and fluid administration.

9 of those patients died so it was impossible to evaluate effects of IO infusion.

In 12 cases medical reports confirmed pain reducing and sedative effect of administered drugs.

IO lines gave free fluid flow, during the transportation time. All of the patients received continuous saline infusion in addition to administered medications.

IO needles were stabilized and protected from mechanical stress, none of lines were displaced during transportation.

CONCLUSIONS

Intraosseus infusion lines are important tools in Emergency Medical Services practice. They give a safe and effective way of administering medications and fluids in cases of difficult intravenous access. Application is technically

easy and fast. It should not be postponed in critical patients.

Most of the cases of B.I.G placement were related to severe trauma or burns and cardiac arrest. These are often related with problems in gaining IV line.

The effective use of B.I.G is simple and valuable after short training.

The use of IO equipment for adults should be included into EMS training program and protocols. The only disadvantage is relatively high cost of IO devices.

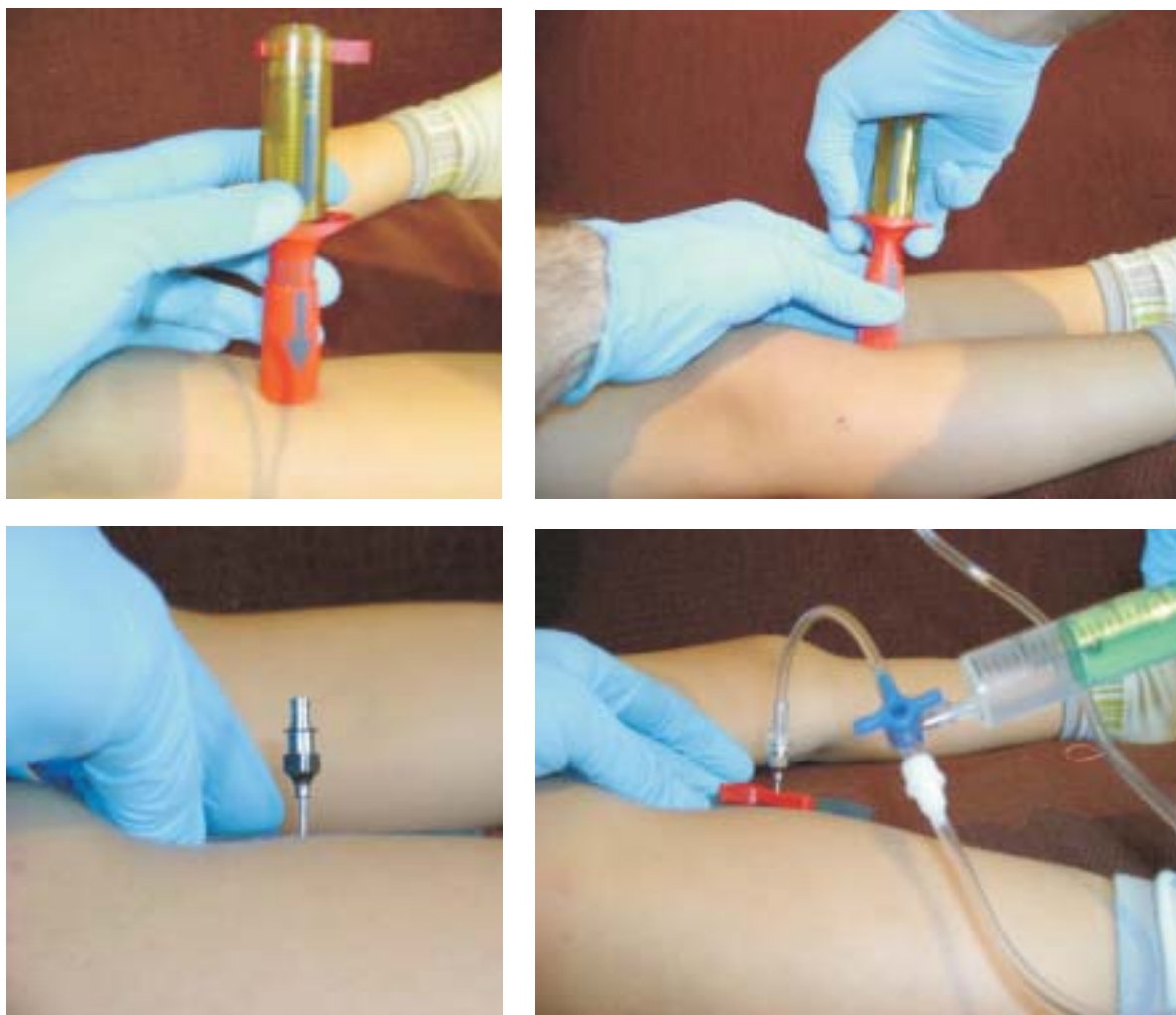


Fig. 1-4. Insertion of the Bone Injection Gun (B.I.G) in the patients tibia

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