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Streszczenie rozprawy doktorskiej w języku angielskim

“An analysis of the knowledge and attitudes of paramedics regarding the use of intraosseous access in patients with acute life threatening illness in the prehospital setting”

Introduction

Establishing intravenous access in order to administer drugs and fluids is one of the fundamental tasks medical personnel perform while providing care for patients experiencing life threatening conditions in the acute setting. In many cases, these patients are in a state of shock or undergoing active cardiopulmonary resuscitation, making venous access challenging and sometimes impossible due to collapse of the venous system. Difficulties in obtaining intravenous access may be exacerbated by stress and time constraints imposed by providing emergency care and performing cardiopulmonary resuscitation. An alternative method to establishing intravenous access in these acute life threatening situations is the use of intraosseous access (IO) devices, which is recommended by many educational committees and societies.

Purpose

The main purpose of this article is to review the knowledge, attitudes, and practical abilities of paramedics in obtaining intraosseous access in patients with life threatening illness in the prehospital setting.

Materials and Methods

These studies were carried out in a simulation center, simulating cardiopulmonary resuscitation using a pediatric training mannequin functioning as a 6 year old child. In order to make the scenario more realistic, chest compressions were performed with the assistance of a mechanical chest compressor- the LUCAS3. During the first study, 87 paramedics established intraosseous access in the proximal tibia utilizing one of four tools chosen at

random; NIO-Pediatric, Pediatric BIG, EZ-IO Drilling Machine, as well as a Jamshidi Bone Marrow aspiration needle. The second study was carried out using a questionnaire, with 168 paramedics participating. The third study also utilized a questionnaire with 100 paramedics participating. A previous article assessing the attitudes of paramedics obtaining IO access during cardiopulmonary resuscitation included 68 participants; all paramedics from the Polish Society of Disaster of Medicine.

Results

In the study comparing four IO devices during simulated pediatric cardiopulmonary resuscitation (NIO-P, Pediatric BIG[®], EZ-IO, Jamshidi) it was observed that the shortest IO access time was achieved with the NIO-P (9s [IQR, 8-12]), followed by the Pediatric BIG[®] (12s [IQR; 9-16]), then the EZ-IO (13.5s [IQR 11-17]), and finally the longest the Jamshidi needle (15s [IQR, 13-19]). Paramedics obtaining IO access with the NIO-P achieved complete access with a 100% success rate, while achieving a 90% success rate with the Pediatric BIG, EZ-IO, and Jamshidi devices. The study participants ranked the ease of obtaining IO access with the four tested devices as follows; NIO-P, EZ-IO, Pediatric BIG with the Jamshidi needle being the most difficult. Among the examined devices, paramedics reported choosing the NIO-P infusion in 91% of real, non-simulated cardiopulmonary resuscitation cases requiring IO access.

In the study evaluating the knowledge of paramedics use of IO access during cardiopulmonary resuscitation of an adult patient, 19% of participants reported to have clinical experience with IO access, while 31.5% of participants took part in a training course covering IO access within a 12 month period preceding this study. 98.2% of participants reported that they would choose to utilize IO access as a method of administering drugs and infusing fluids in the course of resuscitation of an adult patient. The most common reported perceived contraindications for obtaining IO access were; bone fractures (92.8%) and skin lesions at the injection site (79.8%). Among the perceived potential adverse effects of IO access, participants listed; bleeding (89.2%), infection (86.3%) and delamination of the bone used (26.8%).

When examining the knowledge of paramedic's use of IO access in pediatric patients in life threatening scenarios, 9% of participants reported having clinical experience performing this procedure. 21% of participants experienced anxiety related to the use of IO access, which was as a result of: a lack of experience in obtaining IO access (87.1%), a lack of systematic training

with IO access (58.1%), fear of having to explain the necessity of the performed procedure to the physician in the emergency department (54.8%), as well as a fear of causing discomfort to the patient (22.6%). 23% of participants used lidocaine infusions to minimize the pain associated with intraosseous fluid infusions.

In the study concerning the knowledge and attitude of using IO access in resuscitation settings, paramedics reported learning about the procedure from practical training exercises (74.7%), research publications (13.8%) and the internet (11.5%). The majority of paramedics preferred to obtain IO access at the tibia (65.1%), followed by the sternum (26.4%) and finally at the head of the humerus (8.5%).

Conclusions

These studies emphasize the importance of training paramedics with regards to utilizing intraosseous access procedures and devices in daily practice. The primary concern related the use of IO access reported by paramedics is the potential for bleeding. Intraosseous access performed with the aid of semi-automatic devices was found to be more effective than manual IO needles.