

The World War II Anesthesiology Roots of Intraosseous Vascular Access.

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Intraosseous vascular access is recognized as a safe and effective alternative to intravenous access in pediatric emergencies such as trauma, burns and acutely ill patients. The 1980s brought about a resurrection of this valuable technique, primarily through the work of the pediatrician James Orłowski, MD. He was a great proponent of this technique and his seminal article “My Kingdom for an Intravenous Line” built the foundation for the resurgence of interest in intraosseous access. But few know that the intraosseous technique has its clinical roots in World War II anesthesiology

In 1922, the circulation in bone marrow was described. Nearly 20 years later, hematologists working on bone marrow transplantation in laboratory animals described the intraosseous route for administering fluids and blood into the general circulation. They went on to describe the clinical use of intraosseous access in both adults and infants. Emanuel M. Papper (future Chair of Anesthesiology at Columbia University and President of the ASA) was influenced by their work and began studying intraosseous access. As presented at a national anesthesia meeting on December 11, 1941 and subsequently published in 1942, Papper was the first to establish that human circulating time for intraosseous and intravenous administration was nearly identical. In 7 patients he compared the circulation time of the antecubital vein and the marrow of the sternum. Using injections of macasol and 2% sodium cyanide, Papper found that the average circulation time was slightly less for the intraosseous injection than for the intravenous injection. He also showed that anesthesia drugs could be administered through the intraosseous route. His papers also describe various case reports of intraosseous use in adults and infants.

Of course, World War II began for the United States of America in December, 1941. Major Papper served in Europe and eventually became chief of both Anesthesiology and Operating Rooms at Walter Reed Hospital. In these roles, he (as well as other leading lights in anesthesia) spread his knowledge, emphasizing the benefits of intraosseous access as critical to volume resuscitation in hemorrhagic shock. Perhaps most critical was the publication of the technique in the journal *War Medicine* and the subsequent inclusion of intraosseous techniques in wartime medical education. During World War II there were around 4000 documented instances of the intraosseous route being used, the first documented case of it saving a life in combat being that of a 19 year old B29 crew member critically wounded while flying over Japan. In addition, a letter to the editor in *JAMA* in 1943 describes and shows a picture of a Japanese prisoner being anesthetized through an intraosseous line.

Medicine continues to rediscover that which was already known. In the 1980s, intraosseous vascular access was “rediscovered” for use in children. More recently, intraosseous vascular access was “rediscovered” for use in older children, teenagers and adults. As beneficiaries of this research, we should remember the important role of anesthesiology bringing about this clinical use of this critical technique.

References

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