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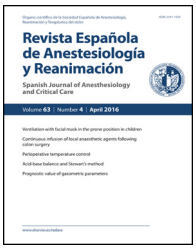

ORIGINAL ARTICLE

Ultrasound versus anatomical landmarks: Immediate complications in the central venous catheterization in children under 18 years of age☆,☆☆

D. Rivera-Tocancipá[a], E. Díaz-Sánchez[a,*], C.A. Montalvo-Arce[b]

[a] *Servicio de Anestesiología y Reanimación, Hospital Universitario Hernando Moncaleano Perdomo, Universidad Surcolombiana, Neiva, Huila, Colombia*
[b] *Unidad Epidemiología-Bioestadística, Universidad Surcolombiana, Neiva, Huila, Colombia*

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KEYWORDS
Central venous catheterisation;
Central venous catheter;
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Abstract
Introduction: The insertion of a central venous line in children and adolescents is technically more difficult, due to the smaller size of the structures. This can lead to an increase in immediate complications, which can be reduced when using ultrasound. In our institution, the percentage of these complications and the use of ultrasound are unknown.
Objective: To describe the frequency of immediate complications of central venous catheterisation guided by the ultrasound in a general university hospital, compared to the anatomical landmarks technique in children less than 18 years of age.
Materials and methods: Observational, retrospective, and analytical study, comparing the frequency of complications with two central venous catheterisation techniques: anatomical landmarks and ultrasound, according to the clinical records of procedures performed from June to November 2016.
Results: A total of 201 procedural records were analysed, of which 71% were with landmarks, and 29% with ultrasound. The overall incidence of immediate complications was 18.4%, with 12% using ultrasound and 21% using landmarks (OR: 0.5; 95 CI: 0.2–1.2). Children under 5 years of age presented with 90% of the complications, the most frequent being the impossibility of passing the guide (29.7%) and multiple punctures (24.3%). There was no arterial puncture with use of ultrasound. Ultrasound was used by 13.4% of paediatric surgeons, by 32.4% of paediatricians, and 46.4% of anaesthetists, with complications of 25%, 19%, and 7%, respectively. The main indication for catheterisation was the need for vasoactive agents (74%), with the procedure being more complicated in patients with no peripheral venous accesses (46%). The success rate with anatomical landmarks was 77.6%, compared to 91.4% with ultrasound.

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* Corresponding author.
E-mail address: dralizdiaz@hotmail.com (E. Díaz-Sánchez).

Conclusion: Central venous catheterisation with ultrasound guidance in children under 18 reduces immediate complications by 42.8% and improves the success rate by 13.8%.

PALABRAS CLAVE
Canalización venosa central;
Catéter venoso central;
Pediatría;
Ultrasonografía;
Complicaciones

Ultrasonido frente a referencias anatómicas: complicaciones inmediatas en la canalización de vía venosa central en menores de 18 años

Resumen
Introducción: En pediatría, la canalización venosa central presenta mayor dificultad técnica debido al menor tamaño de las estructuras, aumentando las complicaciones inmediatas, siendo reducidas al usar la ultrasonografía. En nuestra institución se desconoce el porcentaje de estas complicaciones y del uso del ultrasonido (US).
Objetivo: Describir la frecuencia de complicaciones inmediatas de la canalización venosa central guiada por US comparada con la técnica de referencias anatómicas (RA) en menores de 18 años en un hospital universitario general.
Materiales y métodos: Estudio observacional, retrospectivo y analítico, comparando frecuencia de complicaciones con dos técnicas de canalización venosa central: RA y US según los registros clínicos de procedimientos realizados de junio a noviembre de 2016.
Resultados: Se analizaron 201 registros de procedimientos: el 71% con RA y el 29% con US. La incidencia global de complicaciones inmediatas fue del 18,4%: del 12% con US y del 20,9% con RA (OR: 0,5; IC 95%: 0,2-1,2). Los menores de 5 años presentaron el 90% de las complicaciones, siendo las más frecuentes la imposibilidad de pasar la guía (29,7%) y múltiples punciones (24,3%); con US no hubo ninguna punción arterial. La utilización de US por cirujanos pediátricos fue del 13,4%, por pediatras el 32,4% y por anestesiólogos el 46,4%, presentando complicaciones del 25, del 19 y del 7%, respectivamente. La indicación principal de canalización venosa central fue necesidad de vasoactivos (74%), complicándose más los pacientes que llegaron al procedimiento sin accesos venosos periféricos (46%). La tasa de éxito con RA fue del 77,6% y con US, del 91,4%.
Conclusión: La canalización venosa central con guía US en menores de 18 años reduce las complicaciones inmediatas en un 42,8% y mejora la tasa de éxito en un 13,8%.

Introduction

Central venous catheter (CVC) placement is necessary for the management of children in intensive care units (ICU), and in critical patients in the emergency room and operating theatre.[1–4] In these settings, tools that can increase the success rate and reduce the complications associated with the procedure are invaluable.[5–8]

Complications derived from CVC placement arise in more than 15% of cases, prolonging hospital stay and increasing costs, morbidity and mortality.[2] These complications can arise either during (20%) or after placement.[9–11] Immediate complications include arterial puncture, haematoma, haemothorax, pneumothorax, arterial-venous fistula, intraluminal dissection, venous air embolism, nerve injury, and thoracic duct injury (left side only).[10,12–14] The frequency varies according to the characteristics of the patient (age, weight, anatomy, comorbidities, etc.) and of the procedure (approach, operator experience, type of catheter, anatomical location, ultrasound [US] guidance, etc.).[2,3]

Central venous cannulation has traditionally been guided by anatomical landmarks.[3] The smaller the patient, the greater the technical difficulty of the procedure and the anatomical variations.[4] The incidence of complications varies according to the specialty field of the operator, and range from 2.8% in paediatric surgeons and over 10% in non-surgeons, with an average of 3.5%.[13] The incidence of immediate complications is greater in less experienced operators, and increases 6-fold when more than 3 attempts are made.[12,14]

US is now the standard of care in CVC placement because it improves visualisation of the needle and identification of anatomical structures,[3,12,15] and increases the first-attempt success rate. The immediate complication rates using this technique is as low as 3.5%.[13] However, operators need many hours of simulation-based practice and ongoing training to acquire and maintain the skills required in this technique.[3,4,16]

The aim of this study is to compare the incidence of immediate complications in CVC placement using landmark