

A Method of Augmenting Peripheral Venous Filling

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Introduction

Difficult intravenous (IV) access may be a concern encountered by anaesthesiologists in everyday practice. Peripheral venous catheter placement may be difficult, especially at the extremities of age or if the patient is obese, dark skinned, an IV drug abuser, hypotensive [1]. Currently the methods such as ultrasound, laser rod and local hot compress are adopted to deal with the difficulties but the effect is different. In the clinic we have found it is beneficial to the filling of blood using Esmarch bandage for retrograde strapping blood to the hand vein. In this paper we compare the two approaches of Esmarch bandage and the regular tourniquet way. Now report as follows.

Material and Methods

Thirty adult woman patients ready to surgery were recruited as study participants. The age ranged from eighteen to sixty. Before the surgery they were all treated with bowel preparation and fasting 12 hours. The general information of age, height, weight was registered after the patients entered the operation room.

Each patient was firstly bandaged on the forearm with regular non-pneumatic tourniquet. About twenty seconds later, the pictures were taken on the back of the patients' hand by making a fist. Then the tourniquets were loosened for three minutes. After relaxing, the patients were bandaged on the elbow joint with the Esmarch bandage (10 cm in width and 60 cm in length). Step by step the whole forearm was bandaged to the wrist. The purpose was to make the blood deposit in the hand. Likewise, the pictures were taken on the back of the patients' hand by making a fist. All the patients should be marked and taken pictures in turn. In all of the pictures, the most bulky vein was evaluated by the extent of blood filling. Scoring Standards: The extent of blood filling scores were assigned on visual analogue scale (ranging between zero to ten) by three randomly chosen nurses who were unknown to the marker on the photos, which distinguished the regular tourniquet and the Esmarch bandage. Zero signified the worse exposed and ten signified the best exposed. The average score of the three nurses was used as the index of the extent of blood filling.

Statistical analysis

The data was shown as mean \pm standard deviation. The results were analyzed by t-test in Excel 2003. Difference with $P < 0.05$ means statistically significant.

Results

The average age for the patients was 37 ± 15 , and their average BMI was 25.3 ± 2.6 . All the patients cooperated to accomplish the test. In

the test all of them felt no discomfort. The visual analogue average score for patients using regular tourniquet was less than using Esmarch bandage. The score was 3.3 ± 1.1 and 6.4 ± 1.3 and $P < 0.01$ respectively.

Discussion

Various methods have been used to obtain IV access, including use of warming devices, ultrasound, and Doppler and blood pressure cuffs. The Esmarch bandage is a common device used in orthopedic surgery for exsanguination of the extremities. It is an elastic pressure bandage that compresses the vessel in the direction applied. It is inexpensive and commonly available. Using an Esmarch bandage in a reverse fashion is effective for pooling of blood temporarily, and hence, makes veins prominent, which may help in obtaining difficult IV access. The method exposing peripheral vein with Esmarch bandage is to push the forearm blood to the wrist, [2] which is beneficial to the blood filling in the wrist. So it is beneficial to peripheral venipuncture. In this research we did not compare the puncture success rate between the two methods, because it needed more samples and must choose the fixed patients. It was easily to be disturbed by the factors such as the discordance of the patients' psychological states before and after. Although we could not draw a conclusion that using Esmarch bandage could lead to a higher success rate. We found that the better blood filling was beneficial to puncture success. We should enlarge the sample numbers to do more research about this in future. In the test we found the patients with higher scores using regular tourniquet would score much higher using Esmarch bandage. The probable reason was that the patients with higher scores reserved much more blood in their forearm, when they converted to the Esmarch bandage it would push much more blood to the wrist. However even the patients scored lower, using Esmarch bandage would increase the score obviously. Moreover, it should be important to note that the Esmarch bandage should be strapped continuously and tightly without any gap. We could not qualify the banding strength, as long as the patients felt local tight when strapping. This was a shortage of our research. Besides whether this method was effective to children needed further research.

References

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