Management of the Difficulties in applications and Possible Complications of totally implanted venous Access systems.

Thesis

For partial fulfillment of M.SC.
In general surgery

By
Mohammed Ibrahim Mossad Sholah
M.B.B.Ch. of General Surgery
Cairo University

Under supervision of

Dr Mohammed Hany Hefny
Prof. of General and Vascular Surgery
Faculty of Medicine
Cairo University

Dr Hisham Mostafa Abd Elsamad
Asisst. Prof. of General and Vascular Surgery
Faculty of Medicine
Cairo University

Faculty of Medicine
Cairo University
2010

بسم الله الرحمن الرحيم

(فأما الزبد فيذهب جفاء"وأما ما ينفع الناس يمكث في الأرض)

صدق ا العظيم

سورة الرعد: آية (١٧)

ACKNOWLEDGEMENT

First and for most ….. I thank ALLAH, who gave me everything.

I would like to express my sincere appreciation to *Prof. Dr. MOHAMMED HANY HEFNY* professor of general and vascular surgery, faculty of medicine Cairo University for his continuous support.

And my grateful thanks to *Prof. Dr. HISHAM MOSTAFA ABD EL SAMAD* assist. Professor of general and vascular surgery, faculty of medicine Cairo University for his continuous unlimited support.

Abstract:

Introduction: On the assumption of safety, speed and low cost, some authors postulate that the surgical cut-down technique under fluoroscopic guidance should be the technique of choice for port-a-cath application. However several clinical trials comparing venous cut-down with the percutaneous Seldinger technique concluded that Seldinger technique even without guidance was quick**er** and more effective. The **aim of this study** is to clarify the safe, simple, effective and quick management of difficulties encountered during clinically guided percutaneous port-a-cath application. **Patients & methods:** the study included 320 patients already on/ or scheduled for chemotherapy regimen for different malignancies and planned for port-a-cath insertion. The percutaneous route without radiological guidance was the technique used unless otherwise was indicated. Technically, the subclavian veins were the preferred venous access sites. The patients were clinically assessed and consents were taken. The difficulties and problems encountered during port insertion were studied in addition to the way they were dealt with in analytic way. **Results:** The 320 patients included in the study were 171 males (53.43%) and 149 females (46.57%) with a mean age of 37.5 ± 27.5. The mean time for percutaneous port insertion was 14±5 minutes. Difficulties were encountered in identified and dealt with 34 cases (10.62%). **Conclusion:** The percutaneous port-a-cath application supersedes the open route as it is technically easier and faster and still safe. Radiological guidance is only indicated in limited circumstances. Clinical experience and certain technical tricks can almost replace the need for radiological guidance and can also manage most of the encountered difficulties and the resulting problems successfully.

Key wards:

- **Port-a-cath.**
- **Difficulties.**
- **Complications.**
- **Application.**

List of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBRIVIATION.

T.I.V.A.S.: Totally Implanted Venous Access System

Venous Anatomy and Physiology

A thorough knowledge of the venous anatomy and physiology is important for practitioners involved in the care of patients with vascular access devices ***(Sansivero. 1998).***

Structure of the vein

The vein has three layers, the tunica adventitia, media and intima. These three layers have an impact on venous cannulation and catheter placement. The outer layer of the vein, the tunica adventitia, is composed of elastic connective tissue, which surrounds and supports the vein and contains the capillaries and arterioles that serve the vessel. The middle layer of the vein, the tunica media, is a thicker layer composed of connective tissue and elastic fibers, which allows the vein to tolerate changes in venous pressure and blood flow. Nerve fibers located in this layer constantly receive impulses from the medulla, which can lead to venodilatation and venoconstriction. The inner layer of the vein, the tunica intima, is composed of a single layer of smooth elastic epithelial cells, providing a delicate low friction smooth surface which can be easily damaged during insertion of vascular access devices. Any trauma that damages the endothelial lining encourages platelets to adhere to the vessel resulting in thrombus formation ***(Scales.1999a).***

Venous system control

Venous blood flow towards the heart is brought up by peripheral muscular contractions generated during walking and negative intra-thoracic pressure generated during inspiration. The presence of valves within the veins ensures that blood flow continues in one direction. The sympathetic nervous system is responsible for the contraction and relaxation of the smooth muscle layer in the tunica media with venoconstriction or venodilatation in response to systemic variations in the venous blood flow. Afferent nerve fibers also supply the veins and are responsible for pain sensation ***(Tortora & Graowski. 2002).***

Valves

Valves are semi-lunar projections of tunica intima covered by endothelium and strengthened by collagen elastic fibers. Most often these valves are found in pairs but they can also exist as a tri or a singular cusp. They occur at sites of confluence, and occasionally along a straight path. The valves keep blood flowing towards the heart, and prevent venous stasis. Large veins do not have valves and rely on gravity and negative intra-thoracic pressure to generate blood flow. Valves rarely hinder the ease of insertion of a venous device by obstructing the free passage of a catheter or a guide-wire ***(Jensen 2001).***

Veins used for central venous access:

- Internal & external jugular and subclavian veins.
- Cephalic and basilic veins (for peripherally inserted central catheters).
- Occasionally the femoral veins.

The right side of the patient is usually favored because vessel anatomy allows for direct, shorter, and easier access to the superior vena cava (SVC).

Internal jugular vein (figure 1)

This is a good site for access insertion due to its high success and low complications rate ***(Senff. 1987a).*** The right internal jugular vein provides the shortest and straightest route, thereby reducing the problem of mal-position**.** Problems associated with this vein are catheter occlusion due to head movement, difficulty in maintaining an intact dressing and it might be annoying for the patient, family and friends ***(Weinstein. 1997)***.

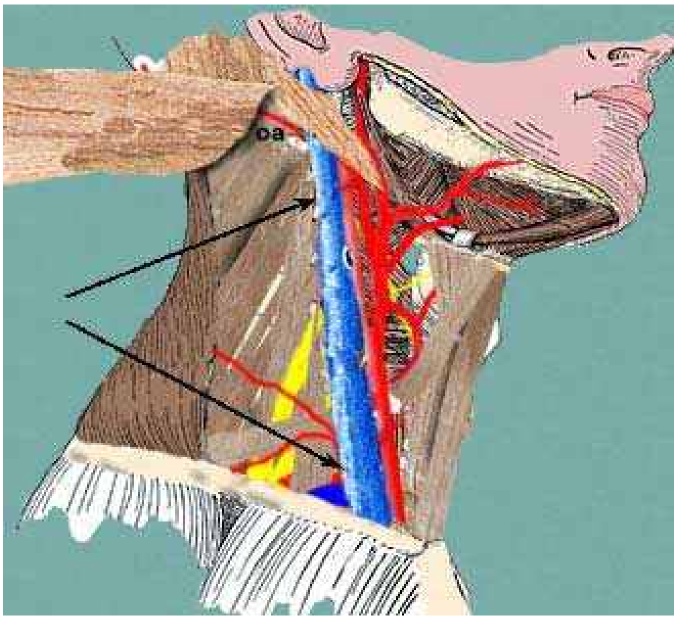


Figure (1) internal jugular vein
Quoted from www.frca.com.uk

External jugular vein (figure 2)

This is a more easily observable and hence easily entered vein, but it varies in size, and its junction with the subclavian vein is angulated making it slightly difficult to be used to access the subclavian vein ***(Scales. 1999).***

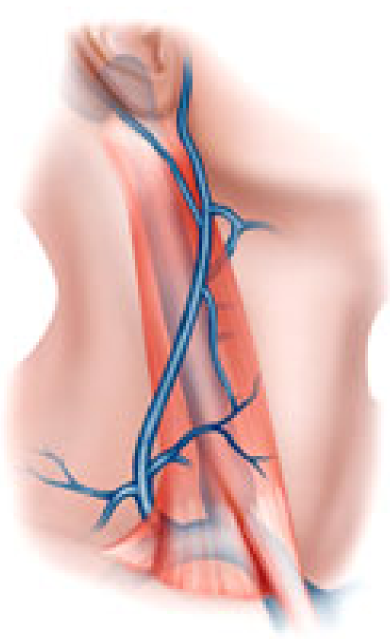


Figure (2) the external jugular vein
Quoted from www.frca.com.uk

Subclavian vein (figure 3)

It has a diameter reaching 19mm and it is the vein of choice for long-term central venous access e.g. for parenteral nutrition ***(Senff. 1987b).*** It is often used because it requires the shortest length of catheter, its size ensures rapid blood flow and there is a decreased risk of irritation and obstruction. It also enables the device to be secured to the chest wall. Contraindications for its use include: SVC obstruction, irradiation of the chest, fractured clavicle and malignancy at the root of the neck ***(Weinstein. 1997).***

Pneumothorax is the most common complication when using this route ***(Scales. 1999).*** If the tip of the catheter is located in the median segment of the subclavian vein, known as a mid-clavicular catheter, it tends to be associated with an increased risk of venous thrombosis ***(Weinstein. 1997).*** Ideally, most catheter tips should be located at the junction of the SVC and right atrium (RA), or within the SVC or upper RA ***(Davidson &Al Mufti. 1997).***

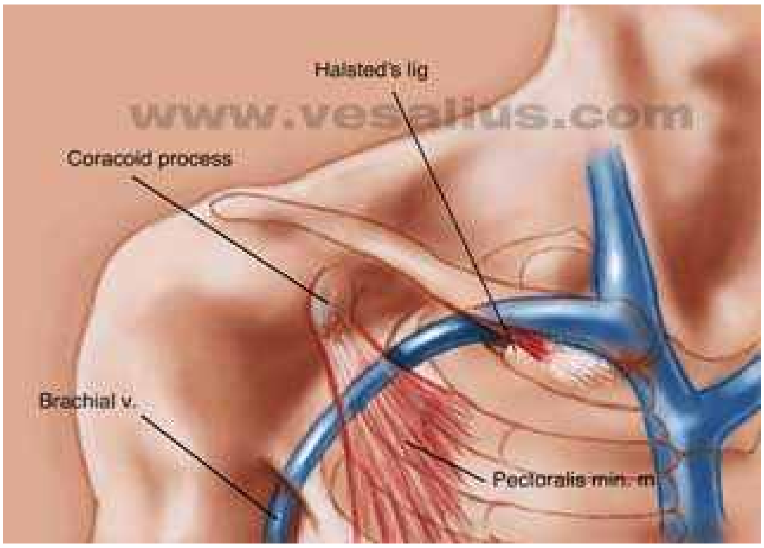
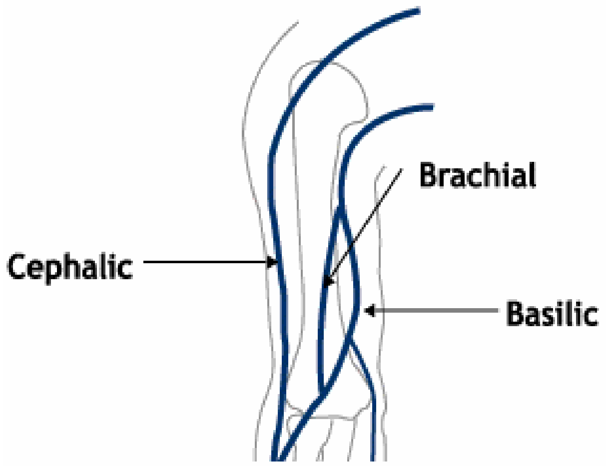


Figure (3) the subclavian vein
Quoted from www.le.xic.us

Basilic vein (figure 4)

It has a diameter of 8mm. Although associated with more valves, yet it is a shorter and straighter making it the preferred vein for insertion of peripherally inserted central catheters.



Figure(4) : basilic vein
Quoted from www.wikipedia.org