UNDERSTANDING INVASIVE MONITORING 1: INDICATIONS

LEARNING OBJECTIVES

1. Identify the need or indications for invasive lines in clinical practice.
2. Understand the advantages and disadvantages of invasive monitoring.

INTRODUCTION

Central lines are a commonly used method for invasive monitoring to help continuously monitor patients’ circulatory status. There are many different indications for the insertion of a central line (Dougherty, 2000). However, it should always be remembered that it is an invasive procedure and as such is associated with a number of potential complications (Woodrow, 2001). These will be discussed in greater detail in part 2.

Central lines are often used in the management of patients who are haemodynamically compromised and need support, it allows a route to enable responsive replacement of circulating volume in accordance with the central venous pressure (CVP), and to guide treatment where clear protocols exist (Reuben et al, 2006).

Despite large volumes of fluid being administered, or in some clinical conditions such as sepsis, a number of patients may need inotropic or vasopressor support. Several of these drugs are not recommended for administration via a peripheral venous line, which means central access is necessary.

As stated earlier, patients with high dependency require close monitoring of their blood values. For those who need frequent venous blood samples taken, a central line may be required as the peripheral options may quickly become exhausted. Central access allows nurses to obtain a venous gas sample to establish tissue oxygenation and perfusion, which is increasingly used in the management of patients with sepsis.

Another reason for insertion of a central line is the administration of parenteral nutrition. Binnekade et al (2005) argued that, where possible, enteral feeding should be adopted as this carries a lower risk of complications. Over the past decade, there has been a significant rise in the number of patients being fed enterally, whereas the number of patients receiving parenteral nutrition has decreased.

Nutrition has been highlighted in recent years as playing an essential role in patients’ recovery. It is sometimes administered parenterally in intensive care. However, as with invasive monitoring, it is now being carried out in the general ward area.

Other patients may be haemodynamically stable but a central line may still be needed to allow the administration of vesicant materials, such as chemotherapy drugs. Areas such as coronary care and intensive care also use this route to facilitate the insertion of a pacing line and drugs such as amiodarone and sodium bicarbonate (Resuscitation Council UK, 2005).

ARTERIAL LINES

Arterial lines are different from central lines in several ways. The most obvious difference is that the cannulation is of an artery instead of a vein.

As with central line insertion, there are clear indications for the insertion of arterial lines. Once more it should be acknowledged that this is an invasive procedure with
potential complications, many of which are similar to those associated with central lines. The main reasons for the insertion of an arterial line are to allow continuous arterial blood pressure monitoring and arterial blood sampling, with arterial BP recordings having greater accuracy than the non-invasive methods for BP recording (Woodrow, 2001).

However, it should be noted that user error can minimise the benefit of arterial pressure measurement. Good practice and consideration of the trend of BP recordings will help ensure that maximum benefit is achieved from the line. While risk of infection is not a contraindication to insertion of an arterial line, it should be considered, especially in compromised patients.

Arterial blood pressure is a measurement of the pressure exerted on the walls of the arteries. This has a direct effect on the perfusion of both oxygenation and the supply of nutrients to the tissues and the removal of waste products from them.

When interpreting BP readings, practitioners should remember that many variables affect blood pressure. Age, disease process and clinical condition mean there are variations from patient to patient. Furthermore, BP tends to rise steadily with ageing.

When acting on a BP result, the patient’s normal reading should always be incorporated into the decision-making process, while also giving consideration to any medications that could influence the recordings (Watson, 2006).

Arterial lines allow direct measurement via the cannula placed in the artery. A variety of arterial sites may be used to achieve this recording.

**INSERTING CENTRAL LINES**

Central line insertion is not always appropriate for all patients. There are several factors that would make central line insertion potentially hazardous and others that would totally preclude use of the procedure.

Patients suffering from coagulopathies would be at risk of excessive bleeding from insertion. While this does not rule out insertion, attempts should be made to correct the coagulopathy and the central vein chosen should be easily compressible. The administration of vitamin K or fresh frozen plasma may help to correct any coagulopathies transiently to allow insertion of the central line.

For patients who have recently had a pacing line inserted or those who have had recent internal vein cannulation, insertion should be avoided if possible.

It should also be avoided in patients who have a history of thyromegaly or previous neck surgery.

For the small number of patients who suffer from superior vena caval compression syndrome, the insertion of a central line anywhere except the femoral vein is contraindicated. Sometimes the femoral route may be the route of choice for patients whose respiratory function is compromised and who cannot therefore be laid flat for the insertion process.

A range of sites is available for the insertion of the central line. The internal and external jugular veins are commonly used in clinical practice, as are the femoral and subclavian veins. Each site carries with it its own particular set of risks and possible complications.

Central line insertion is not always an easy procedure to undertake and is more difficult in some patients than in others. For example, the presence of obesity, confusion or anatomical abnormalities can make insertion more problematic.

Practitioners often find it difficult to locate the artery or identify the surrounding landmarks. On occasions, arterial puncture may occur as a result of improper identification of the site. If this does occur, firm pressure should be applied to the site for 5–10 minutes, until the site has stopped bleeding completely. A clean dressing should be applied over the area and observed for signs of staining, which may indicate further bleeding.

Finding the vein can be extremely difficult, especially in patients who are hypotensive. For these patients – and to follow good practice – ultrasound scanning should be used where available as this enables the practitioner to visualise the vein and this facilitates a safer insertion process (NICE, 2002).

The full reference list for this unit is available in Portfolio Pages at nursingtimes.net

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**KEY REFERENCES**


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