

Patients' Experience of Undergoing Vascular  
Interventional Radiology and Radiographers'  
Experience of Caring for these Patients

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## ABSTRACT

Heart and vascular disease is a health problem through out the world and the technical development in the Interventional Radiology (IR) field is rapid. The possibilities to treat vascular disease has expanded vastly and instead of having traditional open surgery the treatment can be performed by catheterization guided with radiology. The interventions (PCI and PTA) are performed to open or widen narrow cardiac or peripheral arteries by using catheters guided with radiology. The technique is constantly evolving and an increasing number of persons will undergo PCI or PTA. However we still know very little about the patients' emotional feelings and experiences of undergoing these treatments.

**The overall aim** of this thesis was to explore and investigate patients' experience of undergoing Percutaneous Coronary Intervention (PCI) and Percutaneous Transluminal Angioplasty (PTA), and radiographers' experience of caring for patients during Vascular Interventional Radiology (VIR).

**Method:** This thesis consists of four studies and uses both qualitative and quantitative methods. The data collection comprised interviews (studies I-IV) and quantitative measurements (studies III, IV). The participants were patients (studies I, III and IV) and radiographers (study II). Content analysis was used in studies I, III and IV, and a hermeneutic approach in study II. The quantitative measurements were analysed by statistical analysis (SPSS).

**Result:** Four main categories were identified in study I that describe patients' experience during and after PCI: emotional thoughts, bodily sensations, nursing intervention of importance, and personal strategies. Study II focused on radiographers' experience of caring for patients during PTA. The radiographers needed to be able to sense and respond to patients' diverse needs to create a dialogue with the patient and a trusting atmosphere. The radiographers' experiences show the complexity of caring for these patients and the radiographer needs caring skills and compassion in combination with medical and technical competence. Studies III and IV aimed to identify patients who were predominantly calm or anxious in connection with the PTA treatment and to disclose the reasons for these particular feelings. Sixty-nine percent of the patients were calm before the PTA and 78% stated themselves to be calm after the PTA. Lack of knowledge about the disease or treatment options and fear for an unsuccessful outcome of the PTA could cause anxiety. Study IV showed that the encounter and dialogue with the radiographer and physician during the PTA could convey feelings of calmness during the PTA.

**Conclusion:** How the patients were cared for by the staff was considered important both in the acute situation and after the treatment and small caring gestures had a large impact on the patients' wellbeing. The time during and after the procedure can be made acceptable, even in those cases when there are complications and prolonged bed rest. A majority of the patients undergoing PTA are calm both before and after the PTA treatment. How well the patients' experienced the caring chain had worked influenced trust and levels of anxiety. Technology was seen as giving hope for improvement, cure or increased quality of life. The nurse radiographers need time to establish a relationship with the patient and increased possibility to relieve pain. Knowledge and information increase the patients' sense of perceived control and prevents distrust or feelings of being let down. Unpredictability increases the feeling of losing control and upcoming events needs to be more predictable, therefore the logistics regarding referrals and timetables should be looked over. There is a need to strengthen the patients' participation in the decision making regarding their treatment. In order to do so the patients need comprehensive information, knowledge and guidelines.

**Keywords:** patient perspective, radiographers' perspective, radiography, PTA, PCI, calm, anxiety, hermeneutic, content analysis

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## ORIGINAL PAPERS

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## ABBREVIATIONS

AMI	Acute Myocardial Infarction
IR	Interventional Radiology
PAD	Peripheral Arterial Disease
PCI	Percutaneous Coronary Intervention
PTA	Percutaneous Transluminal Angioplasty (in this thesis used exclusively for peripheral interventions) also named: peripheral endovascular interventions/treatments.
VIR	Vascular Interventional Radiology

<b>INTERVENTIONAL RADIOLOGY (IR)</b>				
<b>VASCULAR</b>	<b>NON-VASCULAR</b>			
<b>Vascular interventional radiology</b> - Diagnostic angiography - Balloon dilatation (PCI, PTA, PTR)A - Recanalization - Thrombolysis - Thromb/embolectomy - Stenting - Stent-grafting (EVAR) - Heart valve replacement/Repair - TIPS (transjugular portosystemic shunt) - Embolization (vascular malformations, bleedings, tumors, aneurysms)	<b>Percutaneous drainage</b> - Abscesses, fluid collections - Obstructed renal collecting system - Obstructed biliary tree - Gastrostomy - Cystostomy - Pleural drainage	<b>Percutaneous biopsy</b> - Histological/large bore - Cytological/fine needle aspiration	<b>Percutaneous tumor ablation</b> - Radiofrequency ablation - Cryo-ablation - Ethanol ablation	<b>Other non-vascular interventions</b> - Vertebroplasty - Kyphoplasty

Examples of procedures within Interventional Radiological (IR) an overview not purporting to be exhaustive. Produced with the help and courtesy of Professor Mikael Hellström, Sahlgrenska University Hospital.



## INTRODUCTION

This thesis concerns patients' experience of undergoing Percutaneous Coronary Interventions (PCI) and peripheral Percutaneous Transluminal Angioplasty (PTA) and radiographers' experience of caring for these patients. Both these interventions (PCI and PTA) are performed to open or widen narrow cardiac or peripheral arteries by using catheters guided with radiology. The purpose is to enhance blood flow and thereby improve circulation.

My interest and pre understanding as a radiographer in this specific area comes from working at a cardiology department with PCI. The ability to treat instead of purely diagnose and assess was fascinating and gave a new dimension to my professional experience as a radiographer. The patients had many questions and often expressed fear and anxiety during these interventions. Sometimes these questions concerned aspects that were unexpected and not what could be preconceived by the radiographer. Some of the patients undergoing PCI arrived acutely with an ongoing myocardial infarction. These patients' situation was often medically alarming, and time was of the uttermost essence for being able to give the patient the best care and medical outcome. Other patients undergoing PCI were limited by angina pain or the awareness of a life-threatening heart condition for some time.

The situation is different when it comes to treating peripheral vascular occlusions or a deteriorating peripheral circulation by PTA. The technical procedure is similar to PCI, as in both cases the patient is awake during the treatment, but both patient and radiographer meet other challenges. The patient undergoing PTA may have had constant pain over a long period of time that makes it hard to rest, sleep or be active. In some cases the ischemia has also led to chronic wounds or is so severe that they risk limb amputation. The radiographer might meet a patient with high expectations that this treatment would relieve them of pain and increase their quality of life.

At the same time, it should be noted that the radiology department with few exceptions is one of the most technologically advanced environments in hospitals worldwide. The patient may arrive to the radiology department at a critical time in their life and might be worried about the examination or anxious about the outcome of treatment. It has been found that high technology environments and complicated procedures are experienced as frightening (Vanderboom, 2007; Nightingale, Murphy & Blakeley, 2012). It has also been suggested that technical equipment may alienate the nurse from the patient, which points out the importance of emphasizing the patients' situation in highly technological environments (Sandelowski, 1997; Matthews, 2006). There is also a rapid and continuing development in this field, and the number of individuals who are in need of treatment with PTA and PCI is increasing worldwide.

In Sweden an estimated 10-20% of all retired persons suffer from atherosclerosis in some form (Rosén, 2007). During 2011, 5 670 PTA interventions and 40 228 coronary angiographies, of which 20 628 were PCI, were performed in Sweden (Swedvasc, 2012; SCAAR, 2012).

Altogether, these experiences of the advanced technology and the rapid increase of Vascular Interventional Radiology (VIR) and the need for further research are reasons for my wish to penetrate how caring in this high technological environment is experienced by the patients and the staff. Both PCI and PTA deal with atherosclerosis, but they differ depending on where the atherosclerosis has manifested itself. The patients' problems appear in different areas of the vascular system and the patients' experiences could be assumed to vary accordingly. In both cases there is a wish for relief and, hopefully, a cure. What the patients experience as important before, during and after the treatment might also be different among different individuals. There is a lack of research in patients' experience of these treatments, particularly patients' experience of undergoing PTA.

## BACKGROUND

### History of Interventional Radiology

The catheterization technique used in Interventional Radiology (IR) has a long history. As far back in history as 3 000 B.C., Egyptians performed bladder catheterizations using metal tubes. In 400 B.C., hollow reeds and pipes were used to study the function of cardiac valves in cadavers and, in 1711, the first cardiac catheterization was performed on a horse. It was not possible however to visualize the catheter's path within the body until 1895, when Wilhelm Conrad Röntgen, a German physicist, detected and produced electromagnetic radiation, today known as X-ray or Röntgen (Mueller & Sanborn, 1995; King, 1996; Angioplasty, 2012).

Angiography was developed in 1927 by Egas Moniz, a Portuguese physician who searched for a way to diagnose tumors and artery disease in the nervous system. He used catheters and infused a contrast agent into the bloodstream to make them visible in the x-ray images. This procedure made it possible to examine and document blood flow in vessels. Advancements such as the Swedish Seldinger technique in 1952 had a great impact on the development in interventional procedures. The Seldinger technique means that the vessel is punctured with a sharp hollow needle, a guide wire is advanced through the lumen of the needle and the needle is withdrawn. A blunt tube is passed over the guide wire into the vessel and the guide wire can be withdrawn. The tube remaining in the vessel, usually called an introducer, can be used to insert catheters and other devices in order to perform different procedures, such as angiography, PTA and PCI (Seldinger, 1953). The idea of remodeling the artery by catheterization was introduced by Charles Dotter in 1964. The first peripheral human balloon angioplasty was performed in 1974, and the first coronary balloon angioplasty was performed in 1977 by Andreas Gruentzig (Mueller & Sanborn, 1995; King, 1996; Angioplasty, 2012).

The options for treatment of vascular disease were earlier limited to recommendations about changes in lifestyle, pharmacological treatment and, in more severe cases, open surgery. Today, there are different methods to diagnose and treat vascular disease. Angiography is a diagnostic examination where the vascular system is examined and documented with images as the contrast agent flows through the system. Interventional radiology consists of minimally invasive procedures carried out using image guidance; instead of requiring traditional open surgery, the treatment can be performed by catheterization. The concept behind interventional radiology is to diagnose and treat pathology using the least invasive technique possible. This technique can be used to treat both vascular and non-vascular disease in a variety of settings. VIR includes a vast range of procedures with a focus on the vascular system: carotid, coronary, femoral, lower extremity and renal arteries, as well as neurological arteries (King, 1996; Tarolli, 2007; Angioplasty, 2012).

## **Atherosclerosis**

As both these interventions, PCI and PTA, deals with and are used to treat the same disease- atherosclerosis, it is of interest to further explore what lies behind the need for these treatments. Atherosclerosis is characterized by vascular inflammation and a build-up of lipids, cholesterol and calcium in the vessel wall. Local accumulation of lipids, connective tissue and smooth muscle cells may transform and be replaced by foam cells and fatty streaks, which are considered to be an early stage or precursor for atherosclerotic plaque. Plaque build-up narrows the arteries and can limit blood flow to the targeted organs. As a consequence, the narrowed arteries may cause pain due to ischemia deriving from the targeted organs and the patient will seek help in healthcare depending on the location and severity of their symptoms. The prevention and treatment of atherosclerosis includes medical treatment of hypertension, hyperlipidemia, diabetes mellitus and cigarette habits (Norgren, Hiatt, Dormandy, Nehler, Harris & Fowkes, 2007; Boudi & Subhi Ali, 2011).

Atherosclerosis is an insidious disease and may develop without symptoms for a long period of time. When the first symptoms are noticed, the atherosclerosis may already have narrowed the artery to half its original diameter. Most individuals are affected sooner or later in life, and atherosclerosis is also closely connected to our way of living. Vascular disease is seldom limited to a particular part of the body, and morbidity is widespread in most cases (Norgren et al., 2007; Rosén, 2007).

## **Cardiovascular Disease**

When atherosclerosis manifests as chest pain during physical activity it is a symptom of ischemic heart disease or cardiovascular disease. Angina or myocardial infarction may be the first clinical manifestation of atherosclerotic cardiovascular disease. The medical history will include family history of heart disease, Electro Cardio Gram (ECG), stress ECG, blood samples and in addition examinations such as ultrasound, Computer Tomography (CT) or Magnetic Resonance Imaging (MRI) depending on the symptoms and results (National Heart Lung and Blood Institute, 2012). Patients with acute or ongoing heart symptoms who arrive at the hospital are usually forwarded to the cardiology department for treatment (Pinto et al., 2011).

Previous research on patients' experience of undergoing PCI has addressed their fears in connection with a life threatening disease and anger regarding unmet needs. Moreover, satisfaction with care and concerns regarding nursing during a short hospital stay has also been investigated (Gulanick, Beley, Perino & Keough, 1997; Higgins, Dunn & Theobald, 2001). Patients' experienced the severity of the situation and felt relieved by prompt assistance, the immediate and secure treatment led to a feeling of confidence (Mentrup, Schöniger, Hotze & Flesch, 2010). A study on the patient perspective of experiencing an uncomplicated Acute Myocardial Infarction (AMI) showed the discomfort the patient encountered on falling ill, feeling hurried and being rushed into the emergency room. Moreover, this experience was followed by the disillusionment of being diagnosed with an acute myocardial infarction (Blasdell, 2007). Uncertainty is a major component among patients undergoing acute myocardial infarction. In a case study of how to face this uncertainty, the ways to cope were ad-

dressed in three phases: uncertainty of the progress of the disease, uncertainty about the technical examination and the effectiveness of its treatment, and, finally, uncertainty about the prognosis and self-care abilities (Liao & Lo, 2006). Fears of the result of the Coronary Angiography (CA), the procedure, pain, coronary artery bypass surgery and coronary angioplasty decreased significantly after the CA was concluded. However, there was fear of lying flat in bed after CA and of not receiving support (Trotter, Gallagher & Donoghue, 2011).

PCI is often associated with short hospital stays, and patients are expected to recover at home after limited care time. A study of short hospital stays in connection with PCI concluded that discharge 30-hour post-PCI is possible in more than 95% of suitable cases (Kaluski et al., 2008). However, patients who undergo PCI show low participation rates with regard to cardiac rehabilitation. There is a need for assessment and support of patients' needs regarding pre-procedural anxiety, as it may imply potentially serious consequences such as chest pain, rhythm disturbances and poor recovery patterns (Higgins, Dunn & Theobald, 2000; Sirois, Sears & Bertolet, 2003; Trotter, Gallagher & Donoghue, 2011). When cardiac rehabilitation programs are recommended to patients by healthcare professionals, patients place greater importance on the programs (Fernandez, Salamonson, Juergens, Griffiths & Davidson, 2007). Previous research has stated that patients expected open heart surgery as treatment as opposed to the PCI treatment they received and were impressed. However, their expectations of follow-up in primary care were not met, and they had a poor understanding of the management of the condition (Radcliffe, Harding, Rothman & Feder, 2009).

### ***Peripheral Arterial Disease***

When atherosclerosis is primarily situated in the legs or other areas outside the heart, it is termed Peripheral Arterial Disease (PAD). Several non-coronary syndromes are caused by dysfunction in the arteries that supply the brain, visceral organs and the limbs. PAD may show signs of intermittent claudication, non-healing laceration and infection of the extremities. Pain in a leg or buttock that is aggravated by exercise and relieved by rest can cause walking impairment and non-healing wounds. Depending on the severity of the patients' symptoms, they may initially receive medical treatment and be recommended physical training. Diagnosis is mainly based on the patients' description of symptoms and the clinical examination in terms of pain when walking, possible walking distance, rest pain, appearance and estimated ankle-to-brachial systolic blood pressure. Doppler ultra sound, Magnetic Resonance Imaging (MRI), Angiography and Computer Tomography (CT) Angiography are examinations that are also used to receive a correct diagnosis (Rosén, 2007). PAD is associated with lower functional capacity and may cause limb amputation and increased risk of death. Patients with peripheral atherosclerosis also have an increased risk of developing myocardial infarction and ischemic stroke (Rooke et al., 2011).

PAD and its impact on daily life may impair quality of life owing to pain, reduced energy and restricted mobility. It has been found that pain is the most frequently experienced symptom in patients with PAD and that suffering from pain contributes to many problems in daily life (Breek, Hamming, De Vries, Aquarius & van Berge Henegouwen, 2001; Treat-Jacobson, Halverson, Ratchford, Regensteiner, Lindqvist

& Hirsch, 2002; Wann–Hansson, Hallberg, Klewsgård & Andersson, 2005; Murphy et al., 2008). Physical, psychosocial and emotional disability and a lack of control over the disease are related to a sense of frustration, impaired mood, helplessness and despair (Treat-Jacobson et al., 2002; Johnstone, 2004; Smolderen, Hoeks, Pedersen, van Domberg, de Liefde & Poldermans, 2009). Patients with ischemic pain used different coping strategies and alterations in activity to achieve some pain relief. It is important to prevent the progression of the disease and preserve as independent a life as possible (Wann-Hansson et al., 2005).

### **High Technology Environments**

Angioplasty techniques such as PTA and PCI are performed in high technology environments. Environment is one of the conceptions included in caring science, and each individual experiences the surrounding world in their own, personal way (Fawcett, 2000). A concept analysis done by Ylikangas (2002) shows that the term environment includes the following dimensions: atmosphere, relation, center, surrounding and world. The physical environment includes the space where care is performed and the medical technical equipment needed to perform the examination or treatment. However, when medical technical equipment is used with professional competence in combination with a genuine encounter between the radiographer and the patient, the patient may experience safety and mediate expectations and trust. At the same time, medical technical equipment can mean distance, both geographically and psychologically, if there is a lack in ability and performance. Humans interact with technology for a variety of purposes, and medical technology has been said to both empower and disempower nurses (Sandelowski, 1997; Ylikangas, 2007). One effect of technological advances is that physical encounters between nurses and patients in some settings tend to decrease (Sandelowski, 2002).

### ***The angioplasty techniques***

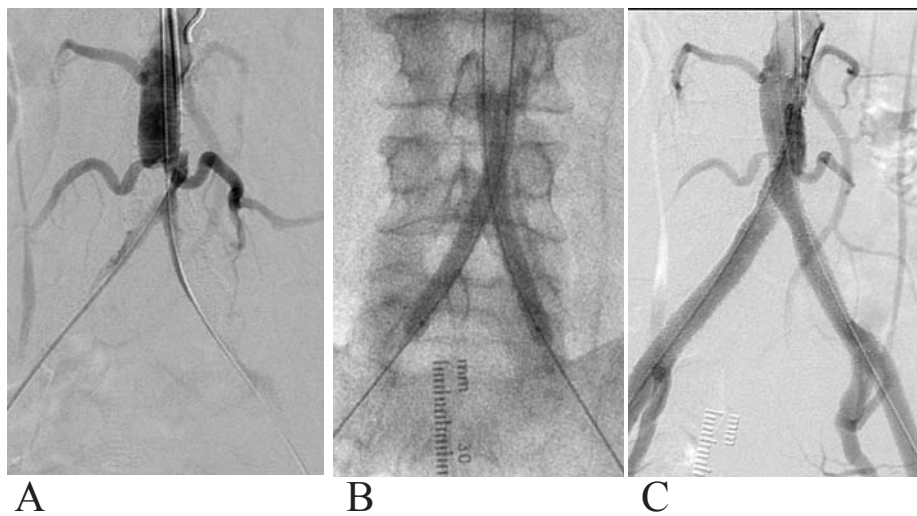
As mentioned earlier the aim of the vascular techniques (PTA and PCI) is to remodel narrowed vessels. The term angioplasty is used to describe vascular treatment using a catheter and a balloon to expand a narrowed artery. A stent may be placed within the expanded artery to maintain the result (Rosén, 2007; Society of Interventional Radiology (SIR), 2012). The procedure is as follows: the patient lies on the examination table at the catheterization laboratory and is draped in sterile clothing. To obtain access to the vascular system, the artery (most commonly arteria femoralis) is punctured and an insertion device is placed (Seldinger, 1953). Guided by fluroscopy, a guide wire is inserted into the vessel to the location at which the catheter needs to be positioned; the catheter can now slide on the guide wire to the proper position. The guide wire is then withdrawn (Angioplasty, 2012; Society of Interventional Radiology, 2012).

The system of inserting device and positioned catheter is used as a delivery system for the different appliances needed for the angioplasty. A thin wire is placed past the area of interest; the balloon can slide on this wire and, when in the correct position, the balloon is inflated to expand the narrow artery. The balloon is then deflated and withdrawn. Stents mounted on a balloon catheter can be positioned in the same way with the help of the thin wire. The stent is expanded by inflating the balloon at the



expanded site within the vessel to maintain the vessel diameter. When the stent is appropriately delivered, the balloon catheter is withdrawn. A variety of technical devices and techniques can be added to the angioplasty procedure to enable a good result (Angioplasty, 2012; Society of Interventional Radiology, 2012).

The procedure and results are documented with angiographic images (Figure 1). When the procedure is concluded, the catheter is withdrawn (with the help of the guide wire). Finally, the insertion device is withdrawn and an occlusion device is placed at the puncture site to prevent bleeding, or this can be done by applying pressure at the puncture site (Rösch, Keller & Kaufman, 2003; Bontrager & Lampignano, 2010; Society of Interventional Radiology, 2012; Angioplasty, 2012).



**A** Digital subtraction angiography of patient with bilateral intermittent claudication. The intrarenal aorta is occluded and there are prominent lumbar collaterals. **B**. Bilateral balloon expanded stents are deployed from the distal aorta and into the common iliac arteries. **C**. Completion angiogram demonstrates rapid flow into the iliac arteries on both sides. Printed with the courtesy to Martin Delle, Södersjukhuset, Stockholm, Sweden.

**Figure 1.** The procedure and results are documented with angiographic images.

Both PCI and PTA are performed in a primarily similar way, although there are differences in materials, diameters and techniques. The PCI procedure gives an opportunity to also use the radial artery as the puncture site since it is possible to reach the coronary arteries from this position. Another reason why it is possible to use the radial artery when performing PCI is that the material used may be of a smaller diameter (Schueler, Black & Shay, 2012; Rao, Bernat & Bertrand, 2012). PCI procedures are connected with anticoagulation before, during and after the procedure. There is also a high preparedness to act in the case of heart complications, and the procedures are performed by physician, either a cardiologists or a radiologists. During a PCI, one of the radiographers is substituted by a nurse specialized in cardiology. Other constellations may also occur and depend on preferred routines at the hospital at which the procedure is performed. There is a rapid development in enabling reconstruction of

the circulation in the vessels situated beyond the knee which was earlier not considered to give good results (Conrad, Kang, Cambria, Brewster, Watkins, Kwolek & La Muraglia, 2009; Balzer, Khan, Thalhammer, Vogl & Lehnert, 2010). PTA procedures are performed by a physician specialized in interventional radiology or a vascular surgeon.

Most previous research on PCI and PTA treatment was done from medical and technical points of view (Kuroda et al., 2005; Yilmas, Gurgun & Dramali, 2007; Conrad et al., 2009; Lookstein et al 2011). Complications connected to the puncture site have been addressed from patient, caring and medical perspectives (Yilmas, Gurgun & Dramali, 2007; Tay, Co, Tai, Low, Lim, Tan & Lee, 2008). Complications such as hematoma or pseudo aneurysm may result in prolonged bed rest and a need for additional medical treatment (Sherev, Shaw & Brent, 2005; Andersen, Bregendahl, Kaestel & Ravkilde, 2005; Höglund, Stenestrand, Tödt & Johansson, 2010).

### ***The procedures of PTA and PCI***

Before the PTA or PCI, the patients have undergone various preparations according to local clinical guidelines, such as showers with antibacterial soap, receiving a peripheral intravenous cannula and, at some hospitals, a urine catheter. Information on the preparations prior to the procedure and the procedure itself is given in a brochure sent to the patient together with the scheduled time. The patient is then informed verbally by the nurse who admits or is responsible for the patient at the vascular surgical unit. The routines may vary depending on whether the patient will have the PTA or PCI performed as pending or as day care patients or in an acute setting.

Patients who will undergo PTA arrive at the angiography suite, which looks like an operating theatre but with more technical equipment (Figure 2). At the angiography



**Figure 2.** Angiographic proceedings.

suite, the patient will meet the radiographers for the first time. Two radiographers will care for the patient during the PTA procedure. One is responsible for the care of the patient and the radiological equipment during the procedure and the other is responsible for assisting the physician. When the radiographers have introduced themselves to the patient, the radiographer responsible for the care of the patient informs the patient about the procedure. The patient is able to ask questions and explain if they have any specific needs or wishes; the patient is also offered a sedative and informed about the possibility to obtain an analgesic during the procedure. Heart frequency, blood pressure and blood saturation will also be monitored throughout the procedure. The radiographer assisting the physician during the procedure will dress the patient in sterile draping and set up the operating table and sterile equipment (Li, 2008; Patatas & Koukkoulli, 2009; Ehrlich & Coakes, 2009; Bontrager & Lampignano, 2010).

The time at which the physician is introduced to the patient varies; either they meet at the vascular surgical unit, cardiology unit, outside the angiography suite or when the patient is prepared on the operating table. The physician makes sure that the patient is correctly prepared and informed about the procedure. The procedure will start with the inducing of a local anesthetic at the entry site, and the artery will then be punctured. As the patient is awake during the procedure, the radiographer is able to talk with, assess and attend to the patient. The physician can give information and show images to visualize the findings and the results for the patient as the procedure moves on (Ehrlich & Coakes, 2009; Bontrager & Lampignano, 2010).

When the procedure is concluded, the catheters and the introducer is withdrawn from the artery, the artery needs to be closed to prevent bleeding. This can be performed in various ways: by applying pressure to the entry site, with a collagen plug, using stitches, by using a metal clip or other medical technical devices developed for this purpose. The choice of the closing device depends on the type of procedure that has been performed, how much anticoagulant medication has been used during the procedure and the preference of the clinic or operator. To avoid bleeding complications at the entry site, the patient must lie still, flat on the back in bed for some time. The time varies depending on local routines, but two to nine hours with a wide variation are common (Huang et al., 2008; Hon, Ganeshan, Thomas, Warakaulle, Jagdish & Uberoi, 2010; Höglund, Stenstrand, Tödt & Johansson, 2010).

It is known that patients experience the hours of bed rest after PCI as uncomfortable and strenuous. Research has been done on patients' experience of immobilization after the intervention. Too short immobilization can cause complications at the puncture site, and a long immobilization increases patients' discomfort. There is still an ongoing search for the optimal time of bed rest. However, as mentioned earlier, it also depends on the type of procedure and the choice of closing technique (Boztosun, Gunes, Yildis, Bulut, Saglam, Kargin & Kirma, 2007; Uzun, Vural & Yokusoglu, 2008).

According to Higgins, Dunn and Theobald (2001), patients' experiences of being prepared for PCI are often anxiety provoking and nurses play an essential role in helping patients to cope with pre-procedural anxiety. High states of anxiety before the PCI also indicate a higher risk for anxiety during the procedure. High anxiety levels during cardiovascular interventions have further been found to increase the risk of complica-

tions such as hemodynamic instability, entailing a risk of inhibited healing as well as interfering with the clinical outcome and patient satisfaction. Moreover, it may entail an increased use of procedural sedation causing hypoxia and apnea, even at usually well tolerated dosages (Schupp, Berbaum, Berbaum & Lang, 2005; Sims & Rilling 2006; Uzun, Vural & Yokusoglu, 2008; Patatas & Koukkoulli, 2009).

Patients' experience of undergoing angioplasty shows a wide variation with both positive and negative experiences. Some patients describe satisfaction with supportive hospital care and trust in medical competence, while others express anger over unmet needs and frustration over a lack of control in decision making (Gulanick, Beley, Perino & Keough, 1997). A study was done of how nurses can assist patients with risk factor modifications and behavioral changes, promoting a positive result and positive outcomes for patients with claudication. The findings from this study show that nurses can assist the patients with in their attempts to normalize high blood pressure and encourage the patients to participate in exercise rehabilitation programs (Treat-Jacobson & Walsh, 2003). The patients' quality of life before and after PTA as well as the long-term effect of the treatment were also studied and showed the importance of providing optimal pain alleviation as well as promoting an independent life (Wann-Hansson, Hallberg, Klevsgård & Andersson 2004; Egberg, Mattiasson, Ljungström & Styruud, 2010; Egberg, Andreasson & Mattiasson, 2012).

### **The radiographer**

Radiographers are healthcare workers with comparable tasks in the professional field in radiology, but the titles and educations vary internationally. The Swedish title is "röntgensjuksköterska", and the professional title in English is radiographer, (National Board of Health and Welfare, 1995:5; 1995:15) therefore the title radiographer will be used within this thesis. The Swedish title "röntgensjuksköterska" translated directly from Swedish to English would be radiology nurse. However, outside Sweden the title radiology nurse can mean a registered nurse working in the radiology department primarily focusing on patient care and without the technological responsibility or competence to execute radiographic examinations (Center for Nursing Education and Testing Inc, 2010).

In Sweden, the major subject in radiographers' education is radiography which is the radiographers' area of professional knowledge, research and responsibility. Radiography is described as having a multi disciplinary base including medical technology and nursing sciences. The radiographer holds a Bachelor of Science (SFS, 1993:100). The education follows the Competence description for Registered Nurses (National Board of Health and Welfare, 1995:5; 1995:15). The ethical guidelines for radiographers are in accordance with the International Council of Nurses' Ethical Code for Nurses (ICN Ethical Code for Nurses, 2000; Code of Ethics for Radiographers, 2008). In Sweden, radiographer is a protected professional title only to be used by those who hold a license to practice (National Board for Health and Welfare EC Directive 2005/36/). The working area for a radiographer consists of a highly technological environment where knowledge in caring, medicine, methodology and medical technique is a necessity (Niemi & Paasivaara, 2007). The training will provide the knowledge required to establish and maintain a caring relationship before, during and after an examination

or treatment (Radiographers' Code of Ethics, 2008). The radiographer is, by law, registered and qualified to assume responsibility and make use of acquired knowledge (National Board of Health and Welfare, 1995:5; 1995:15; HFS 1998:1003 ). However radiography is a dynamic concept that changes according to context and time (Ahonen, 2008; Andersson, 2012).

### **Caring within radiography**

The caring atmosphere is a part of the environment in the shape of good relationships, communication and access to comprehensive information. A caring atmosphere is an interaction between the physical environment and what the being and doing of the persons involved constitutes (Edvardsson, Sandman & Holriz Rasmussen, 2005). One effect of technological advances is that physical encounters between nurses and patients in some settings tend to decrease (Sandelowski, 2002).

Radiological departments are often designed and organized around technically advanced equipment and short patient contact time and are hence potentially stressful environments (Glendening, 2000; Matthews, 2006; Törnqvist, Månsson, Larsson & Hallström, 2006). A patient's experience of undergoing radiological examination is unique as the patient's preconception of what is going to take place depends on prior experiences, information given and the current life situation (Murphy, 2007; Nightingale, Murphy & Blakeley, 2012).

Caring within radiography includes awareness about the patients' vulnerability in this particular situation and has to be understood from complex characteristics of imaging techniques, communication between radiology staff and staff from the caring unit. The patient needs physical and mental preparation, and the radiographer needs to provide information and ensure the safety of patients and staff (Malcolm, 2006). A thorough exchange of information between the radiology department and the caring unit is essential and a prerequisite for the ability to offer the patient psychological support (Kuroda et al., 2005). However, a caring encounter at the radiology department implies so much more. A caring attitude is an approach that contains emotional presence and an ability to seek understanding for the patient perspective in collaboration with the patient (Watson, 1985; Swanson, 1993; Benner, 2000; Covington, 2005). The necessity to maintain the focus on the patient to sustain good care in a highly technological environment has also been addressed (Kixmiller, 2006; Matthews, 2006). According to Goodwin (2002), there is a risk that nurses' alignment with technology is perceived to enhance their nursing status. This could imply a risk of increasing the focus on technology instead of on the patient. There is a need to recognize the characteristics of the medical imaging environment, as it is easy to become task oriented in surroundings organized around equipment rather than patient needs (Matthews, 2006; Reeves & Decker, 2012).

### ***The Caring Perspective***

Caring originates from human science where the person is seen as an indivisible unity of body, mind and spirit (Watson, 1985; Eriksson, 1987; Eriksson & Lindström, 1999) and where relieving the patient from suffering is the basic and utmost reason for caring (Halldorsdottir & Hamrin, 1996; Fredriksson & Eriksson, 2003). This un-

derstanding implies the importance of seeing the patient as whole in order to be able to decrease the patient's vulnerability and preserve dignity. When the nurse is touched by the patient's situation, the emotional response invites the patient to respond with trust and confidence (Berg, 2006). The care is determined by the way nurses use their knowledge and skills to appreciate the uniqueness of the person for whom they are caring (Warelow, Edward & Vinek, 2008). The nurse, in this case the radiographer, needs to be the patient's advocate, maintaining the patient's integrity and continuously assessing the patient's needs (Goodhart & Page, 2007).

However, care that does not always emanate from the patient's perspective and experiences could be experienced as uncaring, mediating a feeling of being let down or abandoned and thereby cause suffering. Are the nurses emotionally engaged and present, i.e. being with the patient and thereby inviting into a caring relationship, or just being physically present performing their task, i.e. being there. The latter could imply an uncaring situation (Fredriksson, 1999; Fredriksson & Eriksson, 2003).

### **Central concepts**

There are central concepts in caring science such as person, environment, health and caring (Fawcett, 2000; Bergbom, 2012). Caring involves the nurse's competence, professional experience and ability to connect with the patient (Halldorsdottir, 2007). Mok and Chiu (2004) emphasize that the relationship between the nurse and the patient is important for the creation of trust and confidence. Trust is based on ethical considerations such as basic values and responsibility for our fellow men. If trust meets with indifference, reservation or rejection, it may turn to distrust. This is an unpleasant experience and, to prevent this, trust is dismissed in advance (Lögstrup & Brandby Cöster, 1994). The patients' trust has been described as their contribution to the relation (Gadow, 1985), a trust that may be sustained even though the care itself seems both hard to understand or unpredictable (Ekman, Lundman & Norberg, 1999). The patient's ability to feel trust in the caring relationship is essential to maintaining integrity and minimizing feelings of vulnerability (Lundgren & Berg, 2011). The relationship between the nurse and the patient is asymmetrical. It will always be to the nurse's advantage, and the nurse must constantly be aware of this imbalance (Kasén, 2002; Delmar, 2012). However, we cannot meet each other without entering into a relationship, and a person's opportunity for self-expression depends on how he/she is treated and considered by others. A receptive attitude from the nurse may expand the patient's room for action and feeling of safety. A rejecting attitude may have the opposite effect and render a menacing experience (Delmar, 2012). The experience of being safe is supported by consistency between reasonable expectations and experience of the environment, predictability based on comprehensive information and good caring relations (Williams & Irurita, 2005; Edvardsson, Sandman & Rasmussen, 2005; Williams & Irurita, 2006). Supportive care settings imply experiencing welcoming, recognizing oneself in the environment, experiencing a willingness to serve, safety, and being seen, acknowledged and cared about. This was also described as "sensing an atmosphere of ease" (Edvardsson, Sandman & Rasmussen, 2005, p.347).

## RATIONALE

Cardiovascular diseases are increasing worldwide. Today, in 2012, Vascular Interventional Radiology (VIR) is widely used when atherosclerosis causes impaired vascular circulation. The aim of VIR is to re-establish circulation. Atherosclerosis can manifest itself in different parts of the body with diverse effects on the person. VIR includes several techniques and methods, and focuses on several parts of the human body and will thereby affect the patient in various ways. Patients who undergo a VIR procedure do so in a high technological environment, and they are most likely to be awake.

While the technique is quite similar in both PCI and PTA, patients' ways of becoming ill and the consequences of their diseases are likely to vary, as well as their experience of undergoing these treatments. The patient with a cardiovascular manifestation of atherosclerosis is more likely to have a shorter and more acute experience of the disease that is associated with thoughts of a more existential and life threatening nature (Pinto et al., 2011). The patients who experience a manifestation of the disease in the peripheral part of the vascular system are inclined to have experienced a more silent and slow increase of their problems (Olin & Sealove, 2010; Egberg, Andreasson & Mattiasson, 2012). This implies that, even though both PCI and PTA aim to enhance vascular circulation and even though the procedures themselves are similar, patients' pre-understanding, knowledge and disease awareness might vary. However, most research from the patients' perspective so far is concerned with PCI and not PTA.

Patients' experience of undergoing PCI shows a wide variation with both positive and negative experiences. Some patients describe satisfaction with supportive hospital care and trust in medical competence, while others express anger over unmet needs and frustration over a lack of control in decision making (Gulanick, Beley, Perino & Keough, 1997). Research has shown that patients' experiences of being prepared for PCI are often anxiety provoking and nurses play a central role in helping patients to cope with pre-procedural anxiety (Higgins, Dunn & Theobald, 2001). High states of anxiety before the PCI also indicate a higher risk for anxiety during the procedure (Astin, Jones & Thompson, 2005; Gallagher, Trotter & Donoghue, 2010). High anxiety levels during cardiovascular interventions have further been found to increase the risk of complications such as hemodynamic instability, entailing a risk of inhibited healing as well as interfering with the clinical outcome and patient satisfaction (Schupp, 2005; Berbaum, Berbaum & Lang, 2005; Sims & Rilling, 2006; Uzun, Vural & Yokusoglu, 2008).

Therefore to be able to care for patients with anxiety, establish and maintain a caring relationship before, during and after an examination or treatment with VIR, there is a need for more knowledge about experiences from patients and radiographers perspectives. Although an increasing number of patients are undergoing or will undergo PCI or PTA in the future little is known about their experience of undergoing these treatments.

## OVERALL AIM

The overall aim was to explore and investigate patients' experience of undergoing Percutaneous Coronary Intervention (PCI) and Percutaneous Transluminal Angioplasty (PTA), and radiographers' experience of caring for patients during Vascular Interventional Radiology (VIR).

### Specific aims

- Study I      The aim was to describe patients' experience of undergoing CA and/or PCI during and after the intervention.
- Study II      The aim of this study was to describe nurse radiographers' experiences of caring for patients undergoing IR in the catheterization laboratories.
- Study III      The aim was to identify patients who are predominantly anxious or calm before PTA treatment and to explore reasons for these feelings.
- Study IV      The aim was to identify patients who are predominantly anxious or calm during and after PTA and to explore reasons for these feelings.



## METHOD

### Study design

There are different perspectives of experiences in connection with being a patient and undergoing VIR and of being a radiographer and involved with and caring for these patients. For this reason, several methods were used to investigate, describe and understand these experiences. Both qualitative and quantitative methods have been used to fulfil the overall aim of this thesis (Table 1).

**Table 1.** Overview of the four studies.

Study	Aim	Participants	Data collection	Method of analysis
I	The aim was to describe patients' experience of undergoing CA and/or PCI during and after the intervention	14 patients (hospital 1)	Individual interviews	Content analysis (Krippendorff)
II	The aim of this study was to describe nurse radiographers' experiences of caring for patients undergoing IR in the catheterization laboratories	14 radiographers (hospitals 1,2,3)	Individual interviews	Hermeneutic approach (Fleming, Gaidys & Robb)
III	The aim was to identify patients who are predominantly anxious or calm before PTA treatment and to explore reasons for these feelings.	52 patients (hospitals 1,2,3)	Individual interviews MACL Overall question	Content analysis Statistical analysis (SPSS)
IV	The aim was to identify patients who are predominantly anxious or calm during and after PTA and to explore reasons for these feelings.	51 patients (hospitals 1,2,3)	Individual interviews MACL Overall question	Content analysis Statistical analysis (SPSS)

### The qualitative approach

#### **Content analysis**

The roots of content analysis can be traced far back in human history, to the conscious use of symbols, voice and, especially, writing. Content analysis is an empirically grounded method for making valid and replicable inferences from the text to the context of their use. According to Krippendorff (2004, p. 19), there are essentially three kinds of definitions of content analysis as a research method:

- “1. Definitions that take content to be *inherent* in a text
2. Definitions that take content to be *a property of the source* of a text
3. Definitions that take content to *emerge in the process of a researcher analyzing a text* relative to a particular context.”

Each of these definitions has a specific way of conceptualizing content and will thereby influence how the analysis proceeds. This thesis used the third definition of content analysis. Content analysis requires the text to be put in a context in order for it to be analyzed, a context that makes sense in order to answer the research question. The context then serves as a conceptual justification for reasonable interpretations. However, it is important to acknowledge that each reader of a text interprets it from his or her particular perspective. According to Krippendorff (2004), content analysis can be used to identify categories that describe experiences. Texts can be read from different perspectives, and the interpretations and inferences depend on who the reader is. A text can therefore not be said to have a single meaning that can be identified or described. The answers to the research question must be supported by direct observation, plausible argumentation or from related observations (Krippendorff, 2004). Knowledge generated from conventional content analysis generates knowledge based on the participants' perspectives and are grounded in the data (Hsieh & Shannon, 2005).

### ***Hermeneutics***

The term hermeneutics stems from the 17<sup>th</sup> century and was originally used for biblical interpretations (Eberhart & Pieper, 1994). From the ancient rhetorical rule that we must see the whole from the parts and the parts from the whole has been transformed in hermeneutics into the theory of interpretation. Interpretation, understanding and truth are intertwined in hermeneutics and use interpretation as an analytic tool (Gadamer, 1997). Hermeneutics assumes that we experience the world through language, and language therefore provides us with both knowledge and understanding (Byrne, 2001). The aim of hermeneutics is to uncover hidden meanings through interpretation in order to find the essence of what is expressed or what lies behind it. Gadamer (1997) did not develop a research method but considered a structured and systematic approach to be necessary.

According to Gadamer (1997), understanding can only be reached with an awareness of history. This also means that this understanding is not without pre-understanding. Gadamer (2004) concludes that it is only by a clear consciousness of one's pre-understanding that it is possible to reach understanding. Pre-understanding should be identified and managed throughout the research process, in a dialogue with colleagues and friends and by an open dialogue within oneself. To be able to return to and be aware of these pre-understandings, they should be written down. Pre-understanding will change over time as the research process moves on. The process should be described and analyzed in a final discussion. When the individuals involved have reached a mutual understanding of a phenomenon, a shared and expanded understanding of the phenomenon is achieved, called a fusion of horizon. Another important concept in hermeneutics is the hermeneutic circle. It is described by the movement between the whole and the parts resulting in an increased understanding and is a prerequisite for interpretation (Gadamer, 2004).

In this thesis, a hermeneutic approach was used in Study II according to the method of analysis as described by Fleming, Gaidys and Robb (2003). This method includes analyzing the texts using the five guiding steps: (1) Deciding on a question, (2) Identi-

fication of pre-understandings, (3) Gaining understanding through a dialogue with the participants, (4) Gaining understanding through the dialogue of the recorded text and (5) Establishing trustworthiness (Fleming, Gaidys & Robb, 2003).

## **The quantitative approach**

### ***Measurements***

The quantitative approaches in study III and IV were used in order to obtain a classification of the patients into those who were predominantly calm and those who were predominantly anxious. Two quantitative measures were used and both were self-administered. The first was a Mood Adjective Check List (MACL), intended to measure the mood state (Sjöberg, Svensson & Persson, 1979; Persson & Sjöberg, 1987). The short version of MACL consists of 38 adjectives (appendix A) covering basic dimensions of mood: pleasantness/unpleasantness, activation/deactivation and calmness/tension. Each adjective is checked on a four-point response scale with two acceptance and two rejection categories. A mean score is calculated for each dimension and a total score is established. The scale scores in the MACL questionnaire range from 1.0 to 4.0, where the higher score indicates a positive mood. Reference data from the Swedish general population are published by Montgomery, Persson and Rydén (1996). The MACL was used to verify the ratings of the second quantitative measure (appendix B). This was an overall question to assess degree of anxiety/calmness. This question was used to obtain an immediate classification of the patients into those who were predominantly calm and those who were predominantly anxious. The rating scale was bipolar and six-graded with the response alternatives: very anxious, anxious, rather anxious, rather calm, calm and very calm.

### **The four studies**

This thesis includes two qualitative studies (I, II) and two studies that include both quantitative and qualitative methods (III, IV) (see Table 1). Study I focused on the experiences of patients who had undergone CA and/or a Percutaneous Coronary Intervention (PCI). Study I mediated an understanding of the patients' feelings and knowledge of caring actions of importance to the patient in this particular situation. The results of study I evoked an interest in further studying the radiographers' experiences of caring for patients undergoing IR, which is explored and described in study II. The question of similarities and differences with experiences of other IR procedures was brought up. Research on patients' experience of undergoing other vascular interventions for example PTA is difficult to find. Results in study II indicated a need to explore other areas (such as expectations and pain) related to patients' experiences when they undergo Percutaneous Transluminal Angioplasty (PTA), which was done in studies III and IV. Study III identified patients' who were predominantly anxious or calm before in order to explore reasons for these feelings and experiences before undergoing PTA, and study IV focused on the patients' experience during and after the PTA.

In all the studies (I, II, III and IV) the data collection consisted of individual interviews, all interviews were recorded digitally and were transcribed verbatim by the first author. All interviews were initiated with open questions: (I) Can you please

describe your experience of the time during and after the intervention, (II) Can you describe your experiences of caring for patients in the catheterization laboratory, (III) How does it feel and what are your thoughts now when you are waiting for the PTA treatment and (IV) How does it feel and what are your thoughts now when the PTA treatment is over? The participants in studies I, III and IV consisted of patients and those in study II of radiographers in order to gain an understanding of undergoing VIR from two perspectives. In studies III and IV, the data collection consists of individual interviews, a shortened version of a Swedish Mood Adjective Check List (MACL) and an overall assessment of their perceived degree of anxiety-calmness. The data analysis used in study I was content analysis according to Krippendorff (2004). In study II, a hermeneutic approach (Fleming, Gaidys & Robb, 2003; Gadamer, 2004) was used in order to gain a deeper understanding of the radiographers' experience of caring for patients undergoing VIR. Statistical analyses and content analysis were used in studies III and IV to analyze the data.

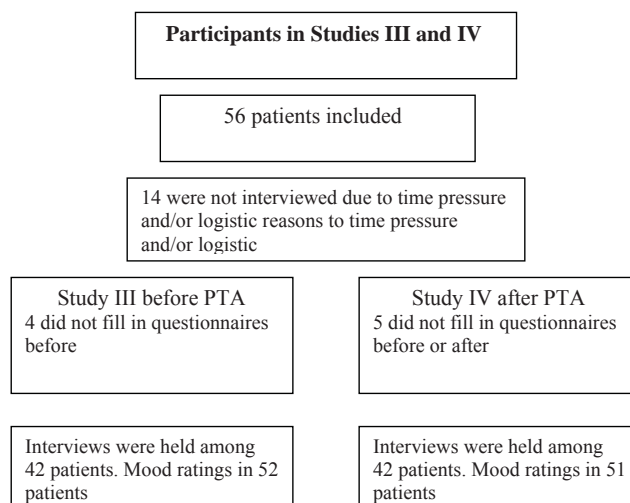
### **Settings**

Study I was done at a university hospital at the cardiology department to which the patients were admitted. Studies II, III and IV were done at three hospitals. Hospital 1 is a university hospital and hospital 2 and 3 are county hospitals in the region where PCI and PTA are performed. At two of the hospitals (1 and 2), the patients who were to undergo PTA were admitted to the vascular unit by a registered nurse responsible for their care before and after the PTA. At the third hospital, outpatients came directly to the radiology department where the nurse radiographer responsible for their care during the PTA admitted the patient.

Study I was done at a university hospital (hospital nr 1) at the cardiology department to which the patients were admitted. Study II was performed at the radiology department at each of the three hospitals. Studies III and IV were done at the vascular unit (hospitals 1 and 2) and in the radiology department (III) and Intensive Care Unit (ICU) (IV) at hospital 3.

### **Participants**

In study I, 14 patients who had undergone CA and or PCI were interviewed, seven men and seven women, between 47–78 years old. Study II consists of interviews with 14 radiographers. They were between 28 and 63 years old and had between two and 20 years of experience of working with IR. All radiographers who regularly work with IR at the three hospitals were invited to participate in this study. There was only one male radiographer among the participants in this group. In studies III and IV included the same 56 patients, 33 women and 17 men (unidentified gender and age among six of them related to the data collection) who were scheduled to undergo peripheral PTA; their age ranged from 48-96 years old with a mean of 74 years. In study III, 52 patients rated their mood (four missing) and 42 of those were also interviewed, 27 women and 15 men. In study IV, 51 patients rated their mood (five missing) and 42 of those were also interviewed (Figure 3).



**Figure 3.** Participants in studies III and IV.

### **Data collection**

In study I, the interviews were carried out in a secluded area at the cardiology department (hospital1) after the PCI procedure was completed, and when the participating patients were able to mobilize from their bed rest (the time interval between intervention and interview varied from one hour to 45 hours). The patients were interviewed using an open-ended question about their experience of the time during and after the intervention. The interviews lasted between 30 and 40 minutes and were held during a period of six weeks in the autumn of 2005. The interviews in study II were conducted at three hospitals (1, 2 and 3). The participating radiographers were interviewed at a time that was convenient for them in a separate room at the radiology department of each of the hospitals. The radiographers were interviewed using an open-ended question about their experiences of caring for the patients in the catheterization laboratory. The interviews lasted between 25 and 70 minutes and were carried out June 2009 - July 2010. Studies III and IV were conducted at three hospitals (1, 2 and 3) at which PTA is performed. At two of the hospitals (1 and 2), patients were admitted to the vascular surgical unit by a registered nurse responsible for the care of the patients before and after the PTA. At the third hospital, patients came directly to the radiology department where the radiographer responsible for their care during the PTA admitted them.

In both studies III and IV the patients were requested to fill in the MACL questionnaire and the overall question concerning whether they felt predominantly anxious or calm. They were then interviewed using an open-ended question about the reasons for their mood state as they waited for the PTA (III). After the PTA was done, the same patients as in study III were requested to fill in the same MACL questionnaire and the overall question concerning whether they felt predominantly anxious or calm. In addition,

the patients were interviewed about how they had experienced the PTA procedure and caring. The interviews were recorded digitally and were transcribed verbatim by the first author. The interviews in studies III and IV lasted between two and 35 minutes. There were several reasons for the short interviews: in study III, time pressure was common and, in study IV, especially the interviews performed at the intensive care unit were consistently short mainly because it was difficult to get privacy. As these short interviews contained valuable information, they were therefore included in the studies. Data collection was carried out between April 2011 and January 2012.

### **Data analysis**

In study I, content analysis was used in the transcribed interviews that were based on an open-ended question. The text was analyzed in an inductive manner, which involves identifying patterns, categories and subcategories. The analyses start with an open reading of the transcribed interviews to get a sense of the whole. A search is then made for words or phrases that can be seen as dimensions or aspects of the patients' experiences. Sentences or part of sentences that contain information about patients' experiences are identified and defined as meaningful units. These units were then transformed into categories and subcategories. The subcategories amplify the width of each category.

In study II, the interviews were analyzed using a hermeneutic approach. The five guiding steps presented by Fleming, Gaidys and Robb (2003) were used. Step 1 was deciding on a research question. In step 2, the authors' pre-understanding was discussed and processed. Step 3 consisted of a first intuitive apprehension of the overall impression of the interview, which was put in writing directly afterwards so that it was possible to gain an overall impression and underlying meaning of the text. In step 4, the second interpretation was made during the transcription of the interview. Trustworthiness was established in step 5 by inviting the participants to read their own transcribed interview. Eight participants chose to comment further on their interviews. Lincoln and Guba (1985) consider that this approach is important because it is the most critical technique for establishing credibility. Those who participated in the study are given an opportunity to assess whether the documented experiences are consistent with their experience (Lincoln & Guba, 1985). The search for understanding continued by reading and re-reading the transcription of the interviews and listening to the recordings, a process that revealed meaning units reflecting more of the participants' experiences. Each interview was then interpreted sentence by sentence, moving from the parts to the whole, and back again. In this hermeneutic spiral, themes that could enhance understanding of the phenomenon under investigation emerged. The themes were finally discussed and challenged with the researcher's pre-understanding.

Studies III (before the PTA) and IV (after the PTA) were analyzed using content analysis, although the outcome of the overall assessment of emotional state was used to divide the patient group into calm or anxious patients, where a score of 1-3 was rated as anxious and a score of 4-6 were as calm. The texts from the 'calm' group of patients were analyzed with a focus on finding reasons for feeling calm and the texts from the 'anxious' group of patients were analyzed with a focus on finding reasons for feeling anxious. Each text was read through several times to obtain a sense of the

whole and then sorted into content areas of specific feelings and thoughts related to the PTA treatment. Content areas that were interpreted to generate calmness were extracted and brought together and read again. Meaning units consisting of sentences or paragraphs related to each other through content were brought together. The meaning units were condensed, abstracted and organized into sub-categories referring to the same content. These were further analyzed, and categories that included different levels of abstraction emerged. The same procedure was then followed in order to analyze the text units representing anxiety. The sub-categories and categories were discussed by the researchers and revised in relation to the predetermined themes.

The groups divided into calm and anxious, according to the overall assessment of emotional state, were also compared with regard to mood state measured by the MACL. These two groups were also compared in demographic and clinical variables. In study IV, additional statistical analyses were performed concerning emotional state over time (Djurfeldt, Larsson & Stjärnhagen, 2007).

## ETHICS

Study I was carried out in compliance with the ethics standards set forth in the Helsinki Declaration of 1975 (World Medical Declaration of Helsinki, 2006). Studies II, III and IV were approved by the Ethics Committee of Gothenburg University D 672-08 and are in accordance with the Helsinki Declaration of 1975 (World Medical Declaration of Helsinki, 2006).

Ethical principles in human research are to generally apply a precautionary principle characterized by moral recognition and respect for the people involved. This project mainly builds on individual interviews. There is always a risk that the interview may activate memories and experiences and thereby cause a psychological burden or that the participants' personal integrity is threatened. However, according to our knowledge, this did not occur to the participants in this project. Particular consideration was given to maintaining the participants' autonomy throughout the four studies. Another important issue is that all personal information and data are treated confidentially and in a way such that the participants' integrity is not revealed or negatively affected. The results of the project may benefit patients in the future by contributing to the knowledge of care from a patient perspective in the field of radiography. All participants were approached independent of gender, religion or ethnic background (World Medical Declaration of Helsinki, 2006; Ethical guidelines for nursing research in the Nordic countries, 2003).

In study I, the patients were initially informed about the study by a nurse at the cardiology department. If they were interested in participating, they were approached by the first author. In study II, the radiographers were initially informed about the study by their head of department at each separate hospital, and then given information and invited to participate at a regular staff meeting by the researcher. In studies III and IV, patients scheduled for PTA were informed about the studies by a nurse at the caring unit or radiology unit. If they were interested in participating, they were approached by the first author. The same patients were interviewed twice, once before the PTA for study III and once after the PTA for study IV. All participants in the four studies were informed both verbally and in writing about the study, including assurance of confidentiality. In addition, they were informed that participation was voluntary and that they had the right to withdraw without giving a reason, including assurance that a withdrawal would not affect their care or treatment. Written consent was obtained from all participants as recommended by World Medical Declaration of Helsinki (2006).



## RESULTS

### Study I

Patients who had undergone Percutaneous Coronary Intervention (PCI) described a variety of different experiences. Four main categories were identified that describe patients' experience of the hours during and following the PCI procedure: *emotional thoughts*, *bodily sensations*, *nursing interventions of importance* and *personal strategies*.

*Emotional thoughts:* The situation arouses emotions, existential questions about life and questions about how their life would be in the future. Fear for life, not knowing what was going to happen together with pain, heightened the strain on the patient. The patients had put their wellbeing in someone else's hands during the PCI procedure and felt secure. However, they were very observant about how the staff acted - and the atmosphere between members of the staff affected their sense of security.

*Bodily sensations:* Pain and discomfort due to immobilization because of peripheral circulation problems could cause bodily sensations such as cold feet. At the same time, they could experience that it was too warm in bed, due to the plastic that was used beneath the sheet. It was frustrating not to be able to move around for several hours. The patients who had their CA or PCI done through the radial artery expressed an unexpected relief by being able to sit up directly after the procedure was concluded and to get out of bed within an hour if nothing unforeseen occurred.

*Nursing interventions of importance:* Being well informed and treated with respect as well as how the staff presented themselves to them and gave an impression of competence were important. It was also important that the staff tried to make the patient comfortable during the hours after the intervention.

*Personal strategies:* The patients used different coping strategies to endure the PCI and the bedrest afterwards, strategies such as accepting the circumstances and waiting for time to pass, and keeping occupied by talking on the phone or reading a book. The wish to have the ability to watch TV or something more to entertain themselves with was expressed by some patients.

### Study II

The radiographers' meeting with the patients is complex according to the analysis of radiographers' experiences. The main theme, *sensing and responding to the patients*, is based upon experiences that the radiographers described. In addition the main theme is based on four themes: *creating a trusting atmosphere*, *creating a dialogue*, *dealing with unpredictable outcomes*, and *dealing with pain and agony*.

*Creating a trusting atmosphere:* In order to create a trusting atmosphere, the radiographer needed to be prepared when the patient arrived. To be prepared included having

had enough time to read the patient's medical records, the referral regarding the PTA and knowing that the angiography suite was in order. The radiographer met the patient for the first time when the patient arrived at the angiography suite. This first meeting was considered essential to the outcome of establishing the patient relationship. The mutual presentation of greeting and sharing their names was a way to recognize and place the patient at the center of attention, as was telling the patient who would be caring for them and making caring gestures to comfort and safeguard the patient's integrity. The radiographers described how they "read" and "sensed" the patients during their first encounter. They tried to identify the patients' feelings and needs by using the patients' medical records, the ongoing dialogue with the patient and their knowledge and experience in this field. Assessing the patient's needs in only a few minutes was described as challenging, and the radiographers talked about the need to have a sensitive ear and an open mind.

*Creating a dialogue:* It was mentioned that it is of great importance that the patient is well informed prior to the treatment and that the information given coincides with the actual experience. Furthermore, the patient needs confirmation of previously given information, to receive continuous information during the treatment and follow the course of events. The dialogue was a search for the key to meet each individual patient. It gave the radiographer the opportunity to get to know the patient as a person and enhanced his or her ability to respond to the patients' needs. The number of team members present and involved during the PTA and how well they interacted together was experienced as important. It affected the dialogue between the radiographer and patient but could also have an influence on the overall atmosphere. According to the radiographers, if the patient was in need of a general anesthetic or intensive care during the PTA, the radiographers was supported by nurses specialized in anesthetics. Some radiographers stated that this distanced them from the patient.

*Dealing with unpredictable outcomes:* The radiographers stated that a PTA treatment is unpredictable, meaning that there is no guarantee for success. From the patient's perspective, this may be a reason for frustration and anguish but also had an influence on the radiographers' experience. Radiological interventions that fail can generate feelings of powerlessness and frustration, and caring for these patients can be emotionally stressful. Lack of feedback on the effect of the intervention can distance the radiographers from the patient. The possibility to cure and help was a driving force, and the satisfaction when the intervention was successful was the reward. The continuous development in employing new techniques and possibilities was described as being exciting to be a part of, and a constant challenge to learn.

*Dealing with pain and agony:* To work with radiological interventions means a constant awareness of the patients' pain, anguish, and maintenance of their integrity. The patient is exposed and vulnerable and need comfort, empathy and care. The radiographers try to distract the patients by conversation and caring activities. The atmosphere in the catheterization laboratory is partly dependent on the staff's ability to interact with each another and a positive atmosphere affects the patients and generates a feeling of security and the patient can relax. However, it is emotionally difficult on occasions when they are unable to alleviate patients' pain.

### **Study III**

#### ***Measures of emotional state before the PTA***

Out of totally 42 participating patients, 13 (31%) rated themselves as anxious (score 1-3) and 29 (69%) as calm (score 4-6) on the overall question. These two groups scores differed correspondingly and statistically significant in MACL as well. There was no significant discrepancy in mood ratings concerning gender age or whether they had prior experiences of PTA or not.

#### ***Reasons to feel calm before the PTA***

Reasons to feel calm before the PTA generated two categories: *a sense of being safe* and *high expectations*.

*A sense of being safe:* Calmness was generated from a sense of being safe and having high expectations. The patients had turned to the care centre in search for help and been informed, medicated and, if needed, referred to the surgical unit. The reception when they arrived to the hospital for the PTA influenced whether they felt welcome or not. It was appreciated to be met by someone who knew who they were, that recognized them and who knew specifically why they had come to the unit or the department. In addition, compassion and smiles from the staff made the patients feel calm and conveyed a feeling of being professionally cared for.

*High expectations:* The written information received together with the scheduled time was appreciated as well as receiving explanations for the various preparations they had to undertake prior to the PTA. To receive the appointment for the PTA was a relief and the patients expressed that they were hoping that the PTA would enhance their situation and make them able to resume their daily tasks and relieve them from pain.

#### ***Reasons to feel anxious before the PTA***

Reasons to feel anxious before the PTA generated two categories: *a sense of despair* and *apprehensions toward the PTA*.

*A sense of despair:* The patients expect the medication to relieve them from symptoms and disease. However, when pain and difficulties remain the situation could be experienced as hopeless. Some patients expressed thoughts that they had not been taken seriously by their physician or failed to understand the information given about their disease or its treatment options. The patients expressed that they experienced their situation as hopeless when pain and difficulties remained despite the fact that they had followed the physicians' prescriptions. Sometimes the patients had not understood the information given by the physician about their disease or its treatment options. According to them their condition had worsened despite medication, and the PTA was seen as essential in finding out what was wrong with them.

*Apprehensions toward the PTA:* The information was not always perceived to be consistent and this could create insecurity. Some patients expressed that they had not re-

ceived any information or had not understood the given information. To be scheduled with short notice increased the risk not to receive written information regarding the PTA. Unpredictability creates tension and the patients described that they were given an approximate time, but the time given could be changed and this was stressful. Fear of complications or that the PTA would be painful and that they would not be able to cope with the situation was expressed. Patients who had undergone PTA before described uncomplicated as well as complicated and painful procedures. Worries regarding the PTA are mostly connected to the outcome of the treatment. Fear that the PTA would not be successful was often described and patients with severe circulation problems spoke of thoughts of how they would manage at home.

Routines at the surgical unit were sometimes perceived as increasing tension. The early wake up in the morning in order to get prepared for the PTA and then to have to wait for several hours before being sent to the angiography suite made them feel tense. The message that it was their turn could then come suddenly which heightened their anxiety levels. Other stated reasons to be anxious were fear for pain during the PTA or that they would not be able to lie still during the procedure. Those who had experienced an unsuccessful or painful PTA or had had complications related this experience to be afraid that this would happen again. However most of these patients expressed worries regarding the PTA are connected to the outcome of the treatment; fear that the PTA would not be successful and perhaps that open surgery would not work either. Patients with severe circulation problems mentioned the risk of limb amputation if the PTA was not successful.

## **Study IV**

### ***Measures of emotional state after the PTA***

Totally 51 patients completed the assessments of emotional state both before and after the PTA. Of these 42 were interviewed after the PTA about their experiences of the procedure and the caring during the intervention. After the PTA 40 patients (78%) rated themselves as calm during and after the PTA (4-6 on the overall assessment), and 11 (22%) rated themselves to have been anxious (1-3 on the overall assessment). No significant differences were found for age, earlier experiences of PTA or related to hospital where the PTA was performed. Seventeen patients (33%) rated themselves as anxious before the PTA (1-3 on the overall assessment) and 34 patients (67%) rated themselves to be calm (4-6 on the overall assessment). This means that the proportion of patients that felt anxious decreased somewhat from before to after. The mean levels in the MACL dimension calmness also changed significantly over time ( $p=0.037$ , Wilcoxon). There were five patients who changed from being calm before to be anxious after the PTA. All of them were women and for four of them the PTA results were perceived to be negative.

### ***Reasons for feelings of calmness after the PTA***

Reasons for feelings of calmness after the PTA generated the following categories: *to feel well taken care of* and *relaxation and hope for a better life*.

*To feel well taken care of:* The encounter with the radiographer and a calming dialogue was expressed by the patients as informative and making the patients feel well taken care of. Furthermore, the imaging technique was described by the patients as both informative and fascinating. The radiographers were described as considerate and that they seemed to do what ever they could to make the patients' situation as comfortable as possible. Most patients commented upon that they had to lie quite still during the procedure and described how they were given pillows under their back or leg and soft textile to relieve painful wounds.

The dialogue with the radiographers and physicians during the PTA was calming. It created a caring relationship and made the patients feel in the centre of attention despite the technical environment. In addition it was stated that it was important to be informed on what was going on and that the radiographers and the physician described what they were doing. To be prepared on what was happening or what may give physical reactions during the procedure made the patient more in control of the situation. Some patients had followed the procedure on the monitors. This was appreciated as it made it possible to visually get an understanding of what their problem was all about. According to the patients statements it made them feel involved and the technical equipment was described as the tool which made treatment possible and was experienced as giving hope for enhancement.

*Relaxation and hope for a better life:* The feeling of relaxation after the PTA was expressed both by patients with a positive outcome and those with a more unsure outcome. Even though they had looked forward to have the PTA performed there had been worries for pain, the outcome of the procedure, what it could reveal or that complications may occur. Now, that is after the PTA was performed they appreciated that it was all over and done. The patients who perceived their treatment as successful were very attentive to any change in their condition and described a variety of physical experiences such as a feeling of warmth in the foot or a tingling sensation or a change in colour of the skin. The patients expressed that they were hopeful to see improvement and filled with thoughts of how it would enhance their situation with daily life.

### ***Reasons for feelings of anxiety after the PTA***

Reasons for feelings of anxiety after the PTA generated four categories: *being unprepared generated insecurity, pain and discomfort during the PTA, pain and discomfort after the PTA* and *insecurity about the future*, and their associated subcategories.

*Being unprepared generated insecurity:* Anxiety could be aroused by feeling unprepared, unrelieved pain as well as insecurity about the future. Not knowing when, or to be sent to the angiographic suite with very short notice was mentioned as building up anxiety. Some patients had been waiting for a short while outside the angiography suite and described the environment as sterile and cold with nothing to look at. Arriving to an angiography suite were it was not restored since the former patient, was described as unwelcoming and to watch when catheters and other equipments were being unwrapped and put forward could build up anxiety.

*Pain and discomfort during the PTA:* Most participants did not experience any pain due to the treatment or felt some pain at particular stages, but this was pain mostly easily managed with medication. However, some participants experienced severe pain that was hard to cope with and where experienced by some patients. Patients with more or less chronic pain who's solution to ease the pain at home when medication was not enough was to move or to let the leg hang down from the side of the bed. During the PTA they had to lie quite still, often with the leg or foot in a specific position. Those participants experienced that they were given as much medication as was possible but it still was not enough. One participant stated it to be terrible and that she could never dream of that it would be so hard and the worst part had been to lie absolutely still.

*Pain and discomfort after the PTA:* Another problem described was to have to lie quite still for a long time during the PTA which was hard and sometimes painful. To lay flat on their back during the procedure and then continue afterwards in bed was considered as tough. It was also described as boring as all they could do was waiting for time to pass.

*Insecurity about the future:* Patients who perceived the PTA as unsuccessful expressed frustration, they thought of which the treatment options were and what possible solutions there might be. According to their statement they did not feel that they had been able to foresee when, in time, they would be scheduled for the PTA, they had merely been waiting. Moreover, some of these patients' descriptions implied that it was hard to understand the criteria needed to receive an appointment for PTA.

## DISCUSSION

### Methods

Based upon the aim of this thesis, both qualitative (I-IV) and quantitative (III and IV) methods were used. The qualitative elements are based in content analysis and a hermeneutic approach. Qualitative research is commonly used in order to describe and explore experiences and feelings and was employed in all the four studies. In studies III and IV, a combination of qualitative and quantitative methods was used to answer the research questions.

Study I focused on patients' experience of undergoing PCI and the choice of method was motivated by the aim of the study. Content analysis made it possible to systematically organize the categories that were found and extracted from the interviews. The patients in study I were interviewed just before they were able to move around freely after their bed rest following the PCI. The reason for interviewing them at that specific time was not to influence their experience of the relief of being able to move around. In study II, the aim was to describe the radiographers' experience of caring for patients undergoing PTA. Hermeneutics offers an approach in terms of searching for understanding but does not prescribe a particular method. Gadamer (2004) emphasized that there are some basic concepts that should be considered, such as pre-understanding, the hermeneutic circle, and the fusion of horizons. The researchers' own pre-understanding was interpreted in order to understand the patients' experiences. However, Fleming, Gaidys and Robb (2003) developed a method using five guiding steps and this method was used in order to attain rigour and structure based on Gadamer's thoughts. The method gave structure to the analysis and possibility to attain rigour. In study II, this meant that the knowledge obtained from the interviews and the researchers' own pre-understanding as a radiographer can be described as a "fusion of horizons" and gave new understanding were part of the "fusion of horizons" in order to gain new understanding of the phenomenon. Moreover, the continuous revision of the researchers' pre-understanding made it possible to read the text to search for a deeper understanding of the radiographers' experience of caring for these patients. The hermeneutic approach, pre understanding, the hermeneutic circle, and the fusion of horizons, made it possible to go beyond the words to interpret the inner meaning of the text.

The number of radiographers that participated was restricted by the number of radiographers working at the three hospitals. Moreover they needed to meet the inclusion criteria, being radiographers working regularly with interventional radiology. The number of radiographers specialized in interventional radiology is limited and it was sometimes difficult to find interview times for them during their work hours. This is likely to have had an influence on the number of radiographers participating in study II, but it was seen as an advantage to be able to perform the interviews during working hours. This could mean a risk of their experiencing a stressful situation that could affect their statements. The interviews were performed July 2009-June 2010.

Studies III and IV aimed to gain a broader understanding of undergoing VIR and as mentioned earlier, research within patients' experience of undergoing peripheral PTA is scarce. A quantitative approach was used (III, VI), to divide the patients into two groups: those with feelings of calmness and those with feelings of anxiety before and after the PTA according to their own rating of their overall wellbeing. A validated measurement was used, to validate this rating: this measurement (MACL) also made it possible to further investigate the patients' wellbeing. The two measurements used were considered to be easy to fill in by the patients but on some occasions they asked for help to write their marks as it could be hard for them when lying down. There were also some patients who asked for help due to poor eyesight. Content analysis was used to analyse the interviews (I, III, VI). The method was found to be appropriate for describing patients' experience of undergoing CA and/or PCI and for exploring possible reasons and explanations for their feelings of calmness or anxiety (III, IV). Some interviews were remarkably short: the reason for this was mainly stress and a lack of time caused by sudden changes in the schedule. At the end of the interview the patient was asked if there was anything else they wanted to add. The qualitative methods (I, II, III, IV) allowed the participants to express themselves in their own words and patterns of understanding emerged during the analysis.

The inclusion of participants was consecutive. However, PTA was not performed every day at all three hospitals and was therefore dependant on the hospitals' time schedules. The data collection was also affected by the geographic distances as sudden changes in the schedule at the vascular unit or angiography suite in combination with the researchers' need to travel one or two hours meant that data from some patients were lost. Fifty-six patients were initially included; however, for logistic reasons, fewer patients (42 in study III and IV) participated in the interviews than in the mood scale (52 in study III and 51 in study IV). It can be seen as a strength that participants from three different hospitals are included (studies II, III, IV) implying that the results reflect several medical and caring traditions. It can be argued that these experiences might be transferred and are in some respects universal, irrespective of the setting. The open-ended questions meant that the participants could answer in a way that they felt relevant and could describe their thoughts and feelings about their situation.

### ***Trustworthiness***

Research credibility has to do with the confidence that can be added to the results. To assess the credibility, each study gives a detailed description of the method used. To enhance credibility and prevent misunderstandings or distortion, the participants' statements were followed up by questions meant to clarify the meaning of what the patient described. Moreover, quotes were used so that the reader could judge the reasonableness of analysis performed and to illustrate the participants' views. Conformability was sought by striving to thoroughly clarify each step in the analysis processes. To ensure transferability, the interviews and data collections were performed at about the same time in relation to treatment. The radiographers were interviewed at a time and place they found most appropriate (Lincoln & Guba, 1985).

The results of these studies are likely to be transferable to other contexts of care, both in interventional radiology and in other similar contexts (settings) such as minor day



care surgery. In qualitative research, transferability is a commonly used criterion for assessment (Patton, 2002).

## **General discussion**

The findings in this thesis display the complexity of the patients' experiences and feelings of undergoing Vascular Interventional Radiology (VIR). The nurse radiographers' experience of caring for these patients was also complex in their attempt to meet these patients' needs and care for them during a comparatively few but intense hours. This section will discuss the patients' experience of undergoing PCI and PTA before during and after the VIR procedure. The radiographers' experience of caring for these patients will then be discussed.

## **Patients experience of undergoing PTA and PCI**

### ***Before***

The patients' experience and feelings before the VIR procedure depend on a number of things, for example, how the situation emerged—in an acute way or following a long period of illness. Even though the PCI and PTA techniques are quite similar, the location of symptoms has a great influence on the patients' experience. There is one particular difference between patients undergoing PCI and PTA apart from the location of the symptoms. Coronary disease and PCI are closely connected with existential questions about life and the onset of coronary disease is more often acute.

The result of studies I, III and IV suggest that patients have a high level of trust towards health care and to what medicine can accomplish. However, these studies also indicate that patients can feel neglected or in despair when health care does not live up to expectations. The caring chain could be defined as coordinated activities in healthcare linked together in order to achieve the best result for the patient (Åhgren, 1999; Åhgren, 2003). However, some of the patients in studies III and IV had not understood how the PTA was performed or stated that they did not know the reason for their symptoms. This was surprising as they in order to be eligible for PTA must have met and talked to a physician and the physician most likely have informed them on both the referral and the reason for it. This finding suggests that the information has not been given in a way that the patient has understood. Culverwell, Tapping and Ettles (2012) suggest that treatment should be explained by the radiologist in advance. Moreover, the importance of good routines for information plays an important role in connection to patients' perception of quality of care in the radiology department (Blomberg, Brulin, Andertun & Rydh, 2010).

A majority of the patients in study III stated themselves to be calm before the PTA, and those who considered themselves to be anxious often expressed fear that the treatment would not be successful. The patients undergoing peripheral PTA in study IV generally had a longer history of symptoms and disease. Having lived with the disease for some time and experienced how it had limited their quality of life influenced their feelings towards undergoing PTA. This was elucidated in the interviews as patients who were to undergo PTA spoke mostly of how the disease had affected their lives.

They had high expectations for the effect or outcome of the PTA treatment but not very many thoughts about the procedure itself. The PTA was the means to reach better quality of life, it meant hope for improvement but also anxiety that the treatment would not be successful. Manin (2005) found that IR procedures are anxiety provoking and painful for some patients and that intra-procedural pain is higher in patients with high anxiety levels before the IR procedure. Moreover, it is important to be observant of distress before and during IR procedures as this may cause hemodynamic instability. There is growing evidence that suggests that patients' preoperative anxiety level is predictive of the experience of pain and anxiety during a procedure (Flory & Lang, 2011).

The prevalence of peripheral arterial disease will increase as the population ages and according to Hirsch (2006) the chief challenge might be to make the symptoms of limb ischemia as well known as the symptoms of angina. However, previous research found that patients with myocardial infarction expected open-heart surgery as treatment and had a poor understanding of the management (PCI) of the condition, indicating a need for increased knowledge of treatment options (Radcliffe, Harding, Rothman & Feder, 2009). Moreover, Olin and Sealove (2010) claims that PAD is under diagnosed and undertreated. This implies that there is an unknown but increasing number of individuals in need of knowledge of PAD and its symptoms, in need of a diagnosis and in need treatment. It will be a challenge for the health care system to handle this demand in combination with the wish and goal to offer patient centred care.

In order to feel in control of their situation and take part in their care, the patients need knowledge of what is going to happen and to be able to foresee coming events. It was mentioned that it was important that the proceedings, such as receiving an intravenous cannula and urine catheter and in particular, a predictable time for the PTA treatment were understood by the patient. Sudden changes in the time schedule at the angiography suite affect the patients and create anxiety. Munn and Jordan (2011) state that information provides the means to feel in control, and the findings in study III suggests that there is a need to look further into the logistics with regard to schedules, planning and collaboration between the caring units and the radiology department and to assume a greater degree of patient perspective. When changes in the schedule can not be foreseen due to emergencies or a necessary change in medical priorities, there is a need to find a way to adjust the situation (time schedule) from the patient perspective instead of forcing the patient to adjust to the changed situation (III, IV).

### ***During***

How the patients were received and taken care of by the team at the angiography suite during the PCI and PTA, were of great importance to the patients: That they were expected, met and acknowledged on their arrival and that the angiography suite was restored after the previous patient and ready to receive a new patient (I, IV). Minor nursing actions are also of great importance for the patients' experience and comfort (I, IV). The patients (I, IV) did not speak of the high technological environment as frightening; instead some expressed that the technical development was impressive and fascinating. For example, one patient noted that she had first hesitated in the door

way but commented that the hesitation was just momentarily and was followed by fascination. In previous research, technology within health care has been described as alienating and sometimes also as anxiety provoking (Murphy, 2001; Matthews, 2006; Munn & Jordan, 2011). This was not confirmed in this thesis.

There is a vast and ongoing technical development in most areas of our lives, and technology might thereby be less intimidating. The radiological environment is often cold and sterile, and the patient is in a vulnerable situation. The patient experienced a willingness to serve from the radiographer and this contributed to that they sensed an atmosphere of ease (Edvardsson, Sandman & Holriz Rasmussen, 2005; Berg & Danielsson, 2007). Moreover, results of studies II and IV emphasise the importance of the radiographers' competence and ability to use technology as an integrated tool of their profession in close connection with their knowledge in caring. This is important for establishing a sense of safekeeping and ease. Patients could become tense or anxious when the actual procedure did not coincide with what they had been informed about or had expected, which underlines the importance of consistent information before, during and after IR procedures (Higgins, Dunn & Theobald, 2001; Murphy, 2001; Bolejko, Sarvik, Hagell & Brinck, 2008) According to Marshall (2011) acute coronary heart disease requires continuous information before and on arrival to hospital as well as before undergoing investigations, when receiving their results and discussing treatment options, and pre and post discharge. This would also be applicable for PTA procedures.

The majority of the patients did not express that they experienced pain, in particular from the procedures, or that they had experienced pain that was easily managed with the given analgesic (IV). However, some of those who experienced pain, particularly those with chronic pain or severe ischemic disease had not gained sufficient analgesic during the PTA procedure (IV). In a study it was found that patients could experience great discomfort during IR procedures but experienced that the physician had done his or her best to alleviate the pain (Mueller, Biswal, Halpern, Kaufman & Lee, 2000). Moreover, the patients with high pain scores were not necessarily less satisfied than those who experienced no pain during the procedures. The radiographers feel frustrated and inadequate when they are unable to alleviate the patients' pain. The importance of giving the radiographers the means to relieve the patients' pain during PTA as well as evaluate the effect needs to be given priority. Another difficulty for the patient was to lie still during the procedure: this can be both uncomfortable and in some cases painful. This could often be addressed by minor caring actions and by the fact that their situation was acknowledged by the radiographer, sometimes in combination with analgesics.

### ***After***

The results show that the staff can make the time during and after the procedure acceptable, even in those cases when there are complications and prolonged bed rest (I). Most of the patients experienced pain in the back as a consequence of the bed rest after the PCI and it is also described after PTA procedures (I, IV). The problem of prolonged bed rest was targeted by researchers during the 1990s and is still a target for investigation, and a number of studies have been performed addressing this issue.

Studies have been done on the effects of modifying positioning and early mobilization and have shown less back pain and few complications such as bleeding at the entry site (Pooler-Lunse, Barkman & Fenwick Boock, 1996; Wang, Redeker, Moreyra & Diamond, 2001; Chair, Taylor-Piliae, Lam & Chan, 2003). Studies have also been carried out on arterial closure devices developed in order to shorten bed rest and the need of manual compression after puncturing the femoral artery in order to achieve haemostasis (Koreny, Riedmuller, Nikfardjam, Siostrzonek & Mullner, 2004; Madigan, Ratnam & Belli, 2007). The results of these studies are positive towards shorter immobilization with less back pain, although the variety in treatment, medication and patients' medical background means that there will always be a need for individual assessment. Höglund, Stenestrand, Tödt and Johansson (2010) came to the conclusion that the ideal length of bed rest after femoral coronary angiography is still unknown. In this study it became evident that in order for the patient to be able to adopt an individual strategy to handle the bed rest, information and knowledge were essential. To do so, the patients wished for the ability to watch TV, movies or just look at something nice.

Some patients expressed feelings of relief as they had been given answers to what had caused their illness. However, there is a need for patients to take control of their lives again, and the patients also expressed uncertainty about the future and concern for what consequences their illness would have on their lives (I, IV). Some patients (I, IV) expressed uncertainty when, how and by whom their care would be organized after the procedure.

### ***Radiographers experience of caring for patients undergoing PTA and PCI***

As opposed to most other radiological procedures where the encounter can be remarkably short, IR means a longer encounter between the patient and the radiographer. This gives the radiographer the time and opportunity to genuinely be with the patient. The nursing presence has been defined as connecting with the patient's experience, sensing and going beyond the scientific data and genuinely being with the patient (Wilson, 2008). To do so, the radiographer needs to take part of the patient's experience and perspective. Radiographers need time to meet the patients and to obtain sufficient information about them and emphasised that the dialogue is important both for the medical assessment and the interaction with the patient.

The dialogue with the patients is essential for being able to offer them their patient choice of care, attention and feeling of safety. The patients reported a mainly positive view of the radiographers and stated that the radiographers were able to acknowledge and confirm them in their vulnerable situation (IV). Competence in both caring and technology (radiography) (Andersson, Fridlund, Elgan & Axelsson, 2008), sufficient time to prepare and sufficient information about the patient facilitate the possibility to maintain genuine concern and a relationship with the patient in connection with IR.

The atmosphere between the staff affected the patients' sense of security and wellbeing (I, IV) and was also described by the nurse radiographers (II). The importance of a trusting atmosphere in order to meet the patient and make the patient feel safe and

secure was shown and stated in all four studies. The level of mutual interaction between professional colleagues had an influence on the atmosphere in the angiography suite and was also described by the patients to affect their experience and their ability to feel professionally cared for. This teamwork between professional colleagues is essential and increasingly important, as IR procedures tend to be complex and to demand different professionals to cooperate in new constellations (Kixmiller, 2006).

There are several unknown and unpredictable issues for the radiographer in connection with a PTA procedure. Moreover, the radiographers' encounters with the patient last for a limited period of time, and the patient is in an unusual environment and likely to be anxious about the outcome of the examination or treatment. The amount of time needed for the PTA is hard to foresee as well as is the outcome of the intervention. These questions, which are often asked by the patient, are not possible to answer. A painful procedure where the radiographer has not been able to give the patient adequate pain relief or an unsuccessful intervention could give the radiographer feelings of frustration. It can be hard for the radiographer to receive an overall picture of how these treatments affect the patient as the radiographer do not receive regular feedback on the medical outcome. Research in intensive care units has concluded that a follow-up of what had happened after treatment increases nurses' knowledge and serves the caring relationship (Lindahl & Sandman, 1998; Engström & Söderberg, 2010). These findings highlight the importance and benefit for radiographers to receive regular feedback on the outcome of the intervention.

There is an imbalance between the wish to create a caring relation with the patient and a reality in which time pressure is counteractive and tend to support the feeling of being inadequate. Some radiographers in study II expressed that it could be hard to cope sometimes when they knew there were more patients waiting for treatment than they had time for. Billeter-Koponen (2005) stated the importance to of a working environment that promotes the health of the professionals and decreases nurse turnover. Handling difficult situations, according to Blomberg and Sahlberg-Blom (2007), can be illustrated as a balance between closeness and distance where the team and organization can both facilitate and impede the use of closeness and distance. Booth (2008) suggests that factors such as the radiographers' personality and confidence as well as departmental pressures play an important part in the radiographer-patient interaction.

## CONCLUSION

How the patients were cared for by the staff was considered important both in the acute situation and after the treatment and small caring gestures had a large impact on the patients' wellbeing. The time during and after the procedure can be made acceptable, even in those cases when there are complications and prolonged bed rest. A majority of the patients undergoing PTA are calm both before and after the PTA treatment. How well the patients' experienced the caring chain had worked influenced trust and levels of anxiety. Technology was seen as giving hope for improvement, cure or increased quality of life.

The radiographers need time to establish a relationship with the patient and increased possibility to relieve pain. Regular feedback on the patients' outcome would help the radiographer to cope with straining working situations and in order to remain engaged and compassionate. Knowledge and information increase the patients' sense of perceived control and prevents distrust or feelings of being let down. Unpredictability increases the feeling of losing control and upcoming events needs to be more predictable, therefore the logistics regarding referrals and timetables should be looked over. There is a need to strengthen the patients' participation in the decision making regarding their treatment. In order to do so the patients need comprehensive information, knowledge and guidelines.

## CLINICAL IMPLICATIONS

There is a need to improve and adjust routines that surround the PTA and PCI so that they are more patient friendly and adjusted to a patient perspective. In order to feel in control of their situation and taking part of their care the patient needs knowledge of: when, what and why proceedings such as receiving intra venous cannula, urine catheter, and at what time the PTA or PCI treatment will take place. The majority of the patients felt calm both before and after the PTA. However, some of those patients who were anxious before the PTA described a caring chain that had not worked to their advantage; they felt neglected or misunderstood in their contact with health care with suffering as a consequence. The caring chain is referred to as a chain of coordinated activities in healthcare linked together to achieve the best result for the patient. In some cases there are deficiencies from the patients' point of view regarding comprehension of PAD and most appropriate treatment options.

Short hospital stays, an increasing demand for treatment and socio economic conditions may lead to less time for the encounters between for example the radiographer and the patient. Encounters which this thesis has shown are important both for the patients' well-being and for the radiographers' ability to stay engaged and compassionate in the profession.

This thesis suggests increased cooperation between primary health care, hospital care including IR responsible departments to improve the caring chain and increase knowledge regarding PAD.

## **IMPLICATIONS FOR FUTURE RESEARCH**

- To further look into how knowledge about PAD and its treatment options could increase and the caring chain to be more satisfactory for these patients.
- Explore whether the radiological visualization of the disease is possible to use as a tool to increase knowledge and understanding of vascular disease, lifestyle changes and treatment options.
- To explore how PCI and PTA, which are relatively rapid interventions with short hospital stay, influence the patients' ability to understand what the disease is all about.
- Continued research from the radiographers' perspective, investigating the opportunities of developing the care for these patients.
- More research on how cooperation between health professionals can be further developed to create the best possible environment for patients and staff within IR.



## SUMMARY IN SWEDISH

Hjärtkärlsjukdom är en av de vanligaste orsakerna till sjukdom och död i världen. Den bakomliggande orsaken är vanligtvis arterioskleros som medför kärlförträngningar och därmed försämrad cirkulation. I takt med den medicinsktekniska utvecklingen har behandlingsmetoderna förändrats och öppen kirurgi har i allt större utsträckning ersatts av kateterburen kirurgi som utförs med hjälp av röntgenteknik. Patienten är ofta vaken vid dessa behandlingar till skillnad från motsvarande ingrepp utförd med öppen kirurgi och ställer därmed andra krav på omhändertagandet i samband med behandling. Teknik, behandlingsalternativ, behandlingsmetoder, utfall och långsiktig effekt av behandlingen har utforskats liksom patientens livskvalitet före och efter behandling. Forskning rörande patientens upplevelse av att genomgå interventionell radiologi (IR) har ofta handlat om hur man kan minska oro inför och smärta i samband med behandlingen eller olika behandlingsalternativ i samband med förslutning av punktionsplatsen. Däremot är forskning ur patientens perspektiv av att genomgå vaskulära interventioner begränsad, framför allt patientens erfarenhet av att genomgå PTA.

Hälso- och sjukvård världen över lägger allt större fokus på patientens delaktighet med målet att utgå ifrån patientens behov. För att lyckas med detta måste vi bättre kartlägga vilka dessa är, sedda ur patientens perspektiv.

Denna avhandling består av fyra artiklar med det gemensamma målet att utöka vår kunskap och förståelse för patienter med hjärtkärlsjukdom som genomgår vaskulär interventionell radiologi (VIR). Avhandlingen bygger på fyra delstudier, tre av studierna hämtar data från patienter som genomgår PCI eller PTA (I, III, IV) och en av studierna hämtar data från röntgensjuksköterskor som i sitt dagliga arbete vårdar dessa patienter (II). Samtliga studier består av kvalitativa individuella intervjuer och två av studierna (III, IV) använder också kvantitativa mätinstrument där patienterna själva får värdera sitt aktuella stämningsläge; oro eller lugn (appendix A och B).

Studie I bygger på 14 individuella intervjuer med patienter som genomgått PCI där patienten berättar om sina upplevelser före under och efter PCI behandlingen. Intervjuerna analyseras med hjälp av innehållsanalys. I studie II intervjuas 14 röntgensjuksköterskor som i sitt dagliga arbete vårdar patienter i samband med IR. Röntgensjuksköterskorna ombads berätta om sina upplevelser av att möta och vårda patienter i samband med PTA. Intervjuerna analyserades med hjälp av hermeneutisk ansats. Studierna III och IV bygger på både kvantitativa och kvalitativa data från 56 patienter som genomgick PTA, data samlades in före PTA (studie III) och efter PTA (IV) med samma patientunderlag. De kvantitativa mätinstrumenten bestod av en övergripande fråga om hur de känner sig just nu; från helt lugn till mycket orolig där patienten själv placerar sig på skalan samt en kort version av Mood Adjective Check List (MACL), med syfte att mäta känsloläge (Appendix A och B). Med hjälp av dessa mätinstrument kunde man utläsa om patienterna var lugna eller oroliga. Femtiotvå av patienterna besvarade de kvantitativa mätinstrumenten i studie III (före PTA) och 42 intervjuar-

des. Femtioen av patienterna besvarade de kvantitativa instrumenten i studie IV (efter PTA) och 42 intervjuades. Analysen utfördes med hjälp av innehållsanalys och med (deskriptiv) statistisk analys.

## **Resultat**

### ***Patientens upplevelse före VIR behandling***

Patienternas upplevelse är beroende av hur situationen uppstod - akut eller efter en tids sjukdom. Kranskärslssjukdom och PCI är för patienten i större utsträckning förknippat med existentiella frågor i form av liv och död och sjukdomen debuterar i större utsträckning plötsligt och utan förvarning.

Patienterna med symptom ifrån försämrad blod cirkulation i benen (perifer kärlsjukdom) hade ofta haft ett långsammare insjuknande med ökande symtom och en situation där deras vardagsliv påverkades i allt större utsträckning med en försämrad livskvalitet som följd. Dessa patienter talade också ofta om hur sjukdomen hade påverkat deras liv och de hade förhoppningar på att PTA behandlingen skulle förbättra deras livskvalitet. Båda grupperna uttryckte stor tillit till sjukvård och behandlingsmetod och oron var till övervägande delen förknippad med resultatet av behandlingen. Att patienterna var väl informerade och förberedda och att man visste vad som skulle ske och när, var av stor betydelse för patienten eftersom det gav patienten en känsla av kontroll över sin situation. En majoritet, 69 % skattade sig som lugna inför behandling.

### ***Patientens erfarenhet av behandlingen***

Att vara väntad och bli mött vid ankomsten till angiografi laboratoriet var av stor vikt liksom att rummet var förberett för dem vid deras ankomst. Att någon (röntgensjuksköterska eller sjuksköterska) tog personligt ansvar för patienten när denne kom och försäkrade sig om att denne kände sig välkommen och var i fokus. Kontinuerlig information om vad som skedde och att hela tiden känna att någon hade sin uppmärksamhet riktad mot patienten var viktigt i den utlämnade situation patienten befann sig i. De flesta patienterna upplevde inte behandlingen som smärtsam och den smärtlindring man fick fungerade väl. Men där var också patienter som beskrev en svår och outhärdlig smärta där de givna läkemedlen inte varit tillräckliga för att de skulle få smärtlindring, speciellt de som led av kronisk smärta på grund av ischemi (IV). Patienterna beskrev hur viktig atmosfären i rummet var och hur den påverkade deras upplevelse av trygghet och kompetens. Att de patienter som kunde (förmådde) och så önskade hade möjlighet att följa händelseförloppet på monitorerna (skärmarna) och att läkaren berättade vad som hände och vad de såg var mycket uppskattat av patienterna, det gav också en känsla av delaktighet i behandlingen.

### ***Efter***

En majoritet, 78% av patienterna skattade sig som lugna när behandlingen var avslutad. De flesta patienterna hade en uppfattning av hur behandlingen hade gått när de lämnade angiografi laboratoriet men var osäkra på vad det skulle få för konsekvenser

för dem. Det var också ofta oklart för dem vad som skulle ske nu, både i det korta förloppet och i ett längre perspektiv. Om resultatet uppfattades som mindre lyckat fanns en oro och osäkerhet kring vilka behandlingsalternativ som fanns för dem och vad det skulle få för konsekvenser för dem i ett längre perspektiv.

Att ligga alldeles stilla under ett antal timmar under behandlingen och sedan vara hänvisade till ytterligare strikt ryggläge för att motverka blödningskomplikationer upplevdes av många som den svåraste delen av behandlingen. Det kunde vara både smärtsamt och långtråkigt och man uttryckte avsaknad av något att fördriva tiden med. Här fanns också ett stort informationsbehov vad gällde resultat och fortsatt omhändertagande.

### **Röntgensjuksköterskan**

Interventionell radiologi innebär oftast någon form av behandling och röntgensjuksköterskan vårdar patienten under längre tid än vid många andra röntgenundersökningar och behandlingen kan sträcka sig från en knapp timme men också ofta pågå under flera timmar. Röntgensjuksköterskan möter patienten som regel första gången i samband med att patienten anländer till angiografi laboratoriet. Detta första möte med patienten beskrivs av röntgensjuksköterskorna som mycket viktigt (avgörande). De har tillgång till journalhandlingar men ingen personlig kännedom om personen de möter. Röntgensjuksköterskorna beskriver hur de `känner av` och `läser patienten`. På kort tid skall de skapa ett förtroende och en relation till patienten som kommer för att få sin behandling. Mötet sker i en högteknologisk miljö och de behöver förmedla trygghet, medkänsla och få patienten att känna sig som den naturliga medelpunkten i rummet. Detta försöker man göra genom den relation man skapar i mötet och dialogen med patienten. Ett bra möte förutsätter att man både har tid att förbereda sig själv och att rummet är iordningsställt för att ta emot patienten. Vid en PTA eller PCI arbetar man i team eller lag om flera röntgensjuksköterskor eller sjuksköterskor tillsammans med en läkare. Hur stämningen i teamet och atmosfären på rummet är beskriver röntgensjuksköterskan påverkar patientens förutsättningar att uppleva sig som välkommen och trygg. Atmosfären i rummet eller mellan personalen är beroende av hur väl man känner varandra och antal involverade personer liksom av olika professioner. De flesta patienter bedömer röntgensjuksköterskan kan erbjudas god smärtlindring med de läkemedel och rutiner man har tillgång till. Men i en del fall är patienten svår att smärtlindra och det upplevs som frustrerande och otillfredställande. Återkoppling och feedback på behandlingsresultat sker inte rutinmässigt och det kan vara svårt att få en bild av behandlingens betydelse för patienten.

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