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Standardization of the Possibility of Specialised Nursing Care After Cardiac Catetrization

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ABSTRACT

Aim: Main aim of this report was to determine the possibilities of standardisation specialized nursing care for decannulation of the sheath from arteria radialis, femoralis by using analysis of literary sources.

Introduction: Processual standards nursing procedures at operation and their importance for quality evaluation are significantly enforced by nurse. The procedure of the decannulation of sheath from arterial basin can influence the final effect of catheterization. The sheath standardisation is an important phenomenon contributing to reduction of complications and the quality of the operation as well.

Methods: The methodology is based on research of professional articles from PubMed, Medline, Cochrane, MedscapeNurses databases for a period 1998–2010. It was used a Boolean operator (or/and), with entering the key words. It was found 59 references by using key words,then we worked with 16 references, which were relevantfor the purpose of our report.

Results: The references point to the fact that nursing standards for decannulation of the sheath are often based on conlusions of the nursing research (EBP). They focus on a reduction of bleeding at the injection site from the beginning of the heart catheterization. The standards are focusing on manners and the the length of the compression on arteria femoralis, arteria radialis. According to the references the importance is based on elimination of complications (hematoma, hemorrhage) by introducing the mechanical compression devices, but mainly by high-skilled nursing staff trained in manners of compression and accuracy of application compression devices. In references is emphasized an early patient's mobilization aft er catheterization. This is possible in compliance with the conditions set out by nursing standard for decannulation of the sheath.

Conclusion: The nursing standard is an important part contributing to the reduction of complications and improving patient's comfort. It is particularly important platform abroad.

KEY WORDS

nursing, femoral, radial, standard, catetrization

INTRODUCTION

Diagnostic coronarography and coronary angioplasty has became widely practiced procedures to deal with stenotic coronary artery disease. Diagnostic and interventional catheters, used for the performance, are implemented via the femoral or radial artery. An important part of the performance is decannulation of sheath (inserter), from both the femoral and radial approach. Special nursing care after coronary intervention takes place outside the catheterization room and it usually depends on the department habits, what kind of management is used for decannulation of sheath. This means, who extracts the sheath (doctor, nurse), using what technique, with or without compression aids. At workplaces of interventional cardiology in the Czech Republic it is a doctor, a general nurse with responsibilities for the performance (valid for Faculty Hospital Ostrava), or general nurse under the supervision of a physician, who performs the removal of sheath cannula.

For the safe process of sheath decannulation from the arterial catchment directed by a general nurse, it would be necessary to establish guidelines, procedures, recommendations, thus, specific nursing standard. It means a setting of standards relating to the provision of specialized and highly specialized

nursing care on the catheterization workplace after selective coronary angiography, beneficial not only for the nursing staff (uniform procedures), but especially for patients who benefit from a properly executed nursing interventions and procedures (in terms of reduction of complications and rapid mobilization after the performance). Standard can simultaneously serve as a tool for controlling and management of quality of nursing care, as it provides guidance on conducting audits in this area. The aim of standard nursing procedure is increasing the quality, effectiveness and safety of the nursing process by standardizing procedures and their evaluation.

OBJECTIVE

The aim of the study was to determine, analyzing the literary sources, the possibility of standardizing specialized nursing care to the removal of cannula sheath (inserter) from the radial and femoral artery.

METHODOLOGY

a) Retrieval of scientific articles within PubMed, Medline, Cochrane, MedscapeNurses database for the period 1998--2010. The search was applied using Boolean operator "-or/and" entering the keywords. We found 59 references by keywords, furtherly we worked with 16 references that meet the intentions of work.
b) Classification of identified resources in order to exclude those that did not comply with the intentions of the present study. We chose the texts, which deal with nursing standards to the removal of cannula sheath from the radial and femoral artery, types of compression aids, complications after the removal of sheath, specialized nursing practice according EBP after the removal of cannula. In further processing there were included 16 works (11 full texts).
c) Content analysis of texts a selection of the applicable information in relation to nursing standards.

In the text, we will indicate the results that we have reached in the system of femoral inputs, manual compressions, regime measures, radial inputs, incidence of complications. Table 1 shows 11 processed nursing studies (EBP) according to the references above with positive impact on the change of the nursing standard.

FEMORAL APPROACH IN LEFT HAND CATHETERIZATION

In the past, for diagnosis (coronary angiography) of heart (coronary) arteries it was used exclusively an access through the femoral artery. It implies that the manual compression of the area of femoral artery, after left sided heart catheterization during removal od cannula sheath, was considered the „golden standard", but with discomfort for the patient in need to stay in bed up to 6 hours. During the manual compression, the authors recommend to create a direct pressure for fifteen minutes preserving peripheral pulsations on a limb (Axelberg et al., 2000, p. 11; Dressler et al., 2006, p. 64; Shoulders-Odom, 2008, p. 26–40; Walker et al., 2001, p. 366–375). Katetarizace through the femoral arteryand subsequent execution of decannulation sheath by manual compression requires certain regime measures at the same time,in the sense of bedrest, significantly affecting hemostasis at the injection site. Keeling et al. (1994, p. 14–17)conducted a nursing research aiming to monitor differences in the incidence of bleeding from the point of catheter insertion in patients who kept bedrest for 12 hours and 6 hours after catheterization. There was no significant difference between the two groups, therefore, the post-procedural bedrest reduced from 12 to 6 hours. The importance of time shift led to a reduction in costs and in particular the discomfort to the patient.

COMPRESSION

A randomized, controlled study, realized in Turkey, included 169 patients and monitored the effect of weight load – bags with sand (2.3 to 4.5 kg), the length of their loading on the injection site (30 min – 2 hours), pain according to VAS scale and the possibility of changing the patient's position. Group I – 35 patients, whose position was changed and 4.5 kg load was applied for 30 minutes. Group II – 35 patients, whose position was changed and 2.3 kg load was applied for two hours. Group III – 32 patients, whose position was not changed and 4.5 kg load was applied for 30 minutes. Group IV – 34 patients, whose position was not changed and 2.3 kg load was applied for two hours. Group V – 33 patients, remaining in supine position without change and without load. From the conclusions revealed that the load should not be applied alwaysafter the realized manual compression. The study showed an increase in back pain,which can be corrected by the elevated position of the head to 45 degrees and the option to change position in bed, which promotes physical comfortand thus leads to reduction of use of analgesics (Yilmaz, 2007, p. 390–396).

The results obtained in this study give nurses a etter understanding of the physical needs of patients and the option to implement the appropriate

nursing interventions. Findings of nurses from this study in EBP follow up the medical care with the option to modify the existing post-coronary protocols (standards).

Chlan et al. (2005, p. 391–398) in his work indicates the use of compression aids to stop the bleeding after femoral artery puncture (FemoStop, C-clamp), that reduce the incidence of complications, such as retroperitoneal bleeding, hematoma, pseudoaneurysm, arteriovenous oesophageal fistula, thrombosis, infection.

In 2001, there was a nursing study performed in Australia, comparing the two techniques of compression of the femoral artery (use of FemoStop – compression device and a classic manual compression), the injection site was observed in both groups according to the prescribed protocol (standard). The results of this research show that although using manual pressure compression the hemostasis was achieved faster than with FemoStop, both methods are considered as effective to reduce complications in the groin (Walker et al., 2001, p. 366–375).

The problem, whether there is a significant difference among the three ways of sheath removal (manual compression, mechanical compression using Compressar and mechanical compression using FemoStop), was solved in nursing study to identify the best practices. The study showed no significant differences between groups with respect to age, body mass index, the size of the sheath. Using of manual compression in combination with compression aids showed that it is possible to reduce the time of compression and thereby improve the comfort of patients during femoral approach (Benson et al., 2005, p. 115–121).

Positives and negatives of the use of compression tools were observed in work of Shoulders Odom (2008, p. 26–40). The conclusion implies that advantage of the mechanical compression devices is „hands--free" operation. The disadvantage is that mechanical compression devices can not always be used for obese patients, in severe peripheral vascular disease,furthermore, after replacement of the femoral artery or femoral vein by vascular prostheses – grafts.

In order to enhance and accelerate hemostasis after femoral artery puncture, it is possible to use covering with a special procoagulant agent. A randomized study, carried out in Rex Healthcare Hospital, was based right on the use of procoagulant agents (products with coagulation agent type SyvekPatch NT, D-Stat Dry) to improve the results, and this the time required for hemostasis after sheath removal in cardiac patients. The aim of this study was to determine whether the use of procoagulant covering in combination with manual compression reduces the time of hemostasis, compared with manual compression after coronary intervention. A sample of patients after coronary intervention was randomly divided into 3 groups (Group 1 – manual compression, Group 2 – SyvekPatch NT + manual compression, Group 3 – D-Stat Dry + the manual compression). We included 80 patients in the research. Significant differences between the three groups were in the time required for hemostasis (P-0.20), especially in the group with manual compression only (McConnell et al., 2012, p. 1–5).

RADIAL APPROACH IN LEFT HAND CATHETERIZATION

Developments in the cardiac catheterization techniques, vascular access is very important for improving of comfort and safety of the patient with a positive impact on operational efficiency (Gall et al., 2006, p. 106–108). The development is reflected in the enhancing the implementation of catheterization and interventional procedures from radial approach, cwhich has an impact on improving the patient's comfort, reduction in hospitalization time and the associated economic savings, and possibility of carrying out the outpatient diagnostic coronary angiography. Use of access via radial artery was only 10% in 2007 on a global scale (Jolly et al., 2008, p. 132–140). Trends in the prevalence of radial and femoral approaches in coronary intervention, were analyzed in the USA from National cardiovascular registers in 2004–2007 at 606 centers focusing on the implementation of radial catheterization approach, in relation to the performance success as well as bleeding and vascular complications. Although in the USA the proportion of radial approaches to the PCI recently increased, in the period 2004–2007 it formed only 1.32% of the total number of approaches (Rao et al., 2008, p. 379–386).

Cardiac catheterization through the radial artery is currently in the Czech Republic a full-fledged alternative to the femoral approach, and in numerous workplaces also the method of choice for patients with stable and unstable coronary artery disease. According to data from the National Registry of cardiovascular interventions, there were 43.3% catheterizations performed through the radial artery in 2010 in the Czech Republic. Nursing care after catheterization through the radial artery appears to be less demanding due to the patient's mobility (walking and self-care is maintained, certainly according to the patient's clinical status), and it reduces patient's discomfort. Compression on the radial arte-

ry should be maintained for 3-4 hours, mostly using compression devices (e.g. TRBand).

COMPLICATIONS OF FEMORAL APPROACH

Both approaches to catheterization carry the risk of complications associated with the removal od cannula sheath. The most common complication after cardiac catheterization through the femoral artery is the development of vascular complications (bleeding, hematoma, pseudoaneurysm). From history it is known that complications associated with the removal of cannula (sheath) from the femoral artery were up to 11% (Axelberg, Mayer, 2000, p. 12). Hamon et al. (2007, p. 400) indicate, based on a systematic review and meta-analysis of randomized trials, incidence of complications in the femoral approach in 2–5% of patients after interventional procedures.

Walker et al. (2001, p. 366–375) conducted a comparative study (FemoStop compression versus manual compression) in order to reduce the complications at the injection site. The results showed that the incidence of hematoma has a great relationship to the method of compression used on the femoral artery. In the group with the compression device (FemoStop), there was significantly greater incidence of hematoma. No significant difference in the incidence of hematoma or bleeding was detected between the two groups in relation to risk factors reported in the literature (weight, anticoagulation therapy). The results of this research show that although thanks to the manual compression pressure a haemostasis has been achieved faster, than with FemoStop, both methods are effective to reduce complications in the groin.

Nursing randomized controlled trial, comparing two protocols for the implementation of compression (manual and QuicKlamp), was performed on a sample of 100 patients scheduled for coronary angiography. The study compared the manual compression with the mechanical compression device in achieving hemostasis of sheath removal from the femoral artery, and to define the possibilities of the two techniques to reduce complications.

The results of the five-day monitoring indicate that a negative local expression was observed in the group with compression QuicKlamp (P = 0.046), namely a local swelling at the place of loading of compression in women (P = 0.044). The episodes of chest pain were identified in the group with manual compression (P = 0.014). The results show that QuicKlamp mechanical compression is a safe alternative to manual compression to achieve haemostasis after removing the cannula from the femoral artery (Jones et al., 2003, p. 11–20).

From the findings of the study from Gonzales et al. (2010, p. 25–35), emerged important conclusions that resulted in reductions of vascular complications after removal of the femoral sheath. These have come to create standardized processes (standards), which were based on literature and monitoring of complications in practice, or to set up the team of specially trained nurses of catheterization lab to the removal od cannula sheath, to train staff on the wards and the change in the loading of pressure bandages, so that injection site was accessible and visible. The availability of trained staff for removal of the sheath during the whole day also seems important.

COMPLICATIONS OF RADIAL APPROACH

Transradial approach, which is also associated with decreased morbidity and mortality, contributed to a significant reduction in complications after cardiac catheterization. Results of Agostoni's meta-analysis (2004, p. 44) confirmed low complication rate, severe bleeding from the injection site (in decrease in hemoglobin of 20 g/l, need for transfusion or surgical revision) is significantly lower in patients with radial input (0 % radial, vs. 2.3 % femoral, P = 0.035). An important factor, to influence the complications rate, is the personnel trained in the means of compression, types and regularity of the use of compression devices.

DISCUSSION

Cardiac catheterization are widely used investigation and treatment method especially in patients with coronary artery disease. Together with the preferences of the femoral approaches in history and the progressive trend in access via the radial artery, fundamental changes are happening also in nursing procedures during the removal of cannula sheath. There has been a big move in special nursing techniques after cardiac catheterization, from the manual compression and loading the burden on the femoral access site, which is very unfavorable particularly for comfort of the patient in keeping the bedrest, according Keeling work (1994), up to 12 hours. The conclusion of nursing study of Yilmaz et al. (2000) is questionable, namely the weight of the burden applied (bag of sand)in relation to the total application time on the place where, in one of the control groups, a load on the punctured femoral artery is not recommendedat all. Mechanical compression device to ensure haemostasis after puncture of the femoral and radial artery brought a significant step in nursing practice, as it partly eliminates discomfort to the patient and brings associated new nursing procedures (erudition of personnel in the proper use).

Radial approach becomes very advantageous for its convenience, comfort and early mobilization of patients undergoing cardiac catheterization. More conservative approach to this is in the USA, as mentioned in Rao et al. (2008), when in 2004–2007, the share of radial approaches was only 1.32%.

In the Czech Republic, the radial approach was carried out in 43.3% of catheterizations in 2010, according to data from the National Registry of cardiovascular interventions.

Table 1 Summary of the processed nursing studies (EBP) according to the references above, with positive impact on the change of the nursing standard

Author	Year	Article title	Research problem	Importance for the nursing standard
Keeling, A. W.	1994	Postcardiac catheterization time-in-bed study: Enhancing patient comfort through nursing research. Applied Nursing Research	Reduction of bedrest.	+
Axelberg, Mayer	2000	Arterial closure method: Pull, plug, or close	What are the possibilities to shorten the immobilization of the patient?	+
Walker, S. B., Cleary, S., Higgins, M.	2001	Comparison of the FemoStop device and manual pressure in reducing groin puncture site complications following coronary angioplasty and coronary stent placement	Comparison of compression utilities – FemoStop and manual compression.	+
Jones, T., McCutcheon, H.	2003	A randomised controlled trial comparing the use of manual versus mechanical compression to obtain haemostasis following coronary angiography	Is the mechanical compression safe alternative to the manual compression to achieve hemostasis after sheath removal?	+
Chlan, L. L., Sabo, J., Savik, K.	2005	Effects of three groin compression methods on patient discomfort, distress, and vascular complications following a percutaneous coronary intervention	May a type of compression aids have impact on comfort of the patient, distress, vascular complications?	+
Benson Linda, et al.	2005	Determining best practice: Comparison of three methods of femoral sheath removal after cardiac interventional procedures	Identification of best practices: comparison of three methods to the removal od cannula of the femoral sheath	+
Dressler, D. Dressler, K.	2006	Caring for Patients with Femoral Sheaths: After percutaneous coronary intervention, sheath removal and site monitoring are the nurse's responsibilityWhat is the responsibility of nurses after removing the femoral sheath?	What is the responsibility of nurses after removing the femoral sheath?	+
Yilmaz, Emel, Gurgun, Cemil, Dramali, Alev	2007	Minimizing short-term complications in patients who have undergone cardiac invasive procedure: a randomized controlled trial involving position change and sandbag.	What effect does have the weight of load on the groin and patient's repositioning after the removal od cannula sheath?	+
McConnell, M. K., Bridges R., Marsh N., Jenkins G., Dowdy J., Prasnikar M.	2007	Comparison of diff erent methods for achieving hemostasis after arterial sheath removal	Comparison of different methods for achieving hemostasis after sheath removal	+
Shoulders-Odom, B.	2008	Management of patients after percutaneous coronary interventions	What is the management of patients after catheterization, are mechanical compression devices used with advantage?	+
Gonzales, L., Field, W., McGin, J.	2010	Quality Improvement in the Catheterization Laboratory: Redesigning Patient Flow for Improved Outcomes	Is it possible to improve the quality of care in the catheterization laboratory by trained personnel and uniform nursing procedures?	+

Key: + significance and incorporation into the nursing standard

Femoral and radial approaches always carry some risk of complications, which are derived from the way of management of decannulation sheath. Femoral approaches have a greater risk of vascular complications (bleeding, hematoma, pseudoaneurysm), older work of Axelberg and Mayer (2000) presents complications up to 11%. Hamona (2007) in his work states complication rate between 2–5%. Bleeding complications from the radial approach according to Agostoni (2004) confirmed 0% of complications from radial approach vs 2.3% from femoral approach.

Reduction of complications is very important factor that is a measure of the quality and progress of performed catheterization. One of the important phenomena how to affect positively complications is the finalization of catheterization,ie the decannulation of sheath by the professionally trained personnel according to the prescribed standard.

CONCLUSION

The analyzed data make clear that decannulation of sheath is an important element that can affect the overall result of catheterization. Obtained from foreign sources, we analyzed 11 nursing studies (EBP), that contributed to the creation, completion and updating of nursing standards in various areas (compression method, type of compression utilities, time to achieve hemostasis, adherence of bedrest, erudition personnel for the removal of cannula sheath). Standards of nursing care, related to professional practice – the removal of cannula sheath based on EBP, can contribute to the reduction of bleeding complications, improving patient's comfort and his rapid mobilization after catheterization. Nursing standard is an important part of the performance, has an important platform especially abroad, which was also confirmed by the amount of identified foreign titles in the authorship of registered nurses.

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