

Original Article

Evaluation of Central Venous Catheter Location in Terms of Pain, Comfort and Patient Satisfaction

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Background: Central venous catheters (CVC) are used for different purposes such as peripheral veins cannot be found, patients with the need of long-term and secure venous access, drug applications, parenteral nutrition and central venous pressure measurement. It is placed in anatomical regions such as subclavian, jugular and femoral vein according to patient's condition. Place of catheter affects patients' pain, infection, comfort and satisfaction status. There isn't any study evaluating all of these factors in literature.

Aim: The purpose of this study is to compare the pain level, comfort, and satisfaction status of patients with subclavian and jugular catheters.

Methods: This study was conducted among 51 patients being treated in a training research hospital. A visual analog scale and a questionnaire developed by researchers in accordance with the literature were used to collect the data. The data were then analyzed using the SPSS software package 15.00. The Mann Whitney U test and a chi-square test were used in the statistical comparisons.

Results: Fifty-one percent of patients had subclavian catheters, while 49% had central jugular catheters. There was no significant difference between patients with both catheters in terms of pain and comfort level. However, the satisfaction levels of the subclavian catheter patients were found to be statistically significant ($p < 0,05$).

Conclusion: This study found that subclavian catheters can be applied to appropriate patients as long as the quality of care and patient satisfaction are maintained by evaluating the pain, comfort, and satisfaction levels of CVC.

Keyword : central venous catheter, nursing care, pain management, patient satisfaction

Introduction

Central venous catheterization, which has an important place in modern medical practice (Dedunska & Danuta, 2015), is an invasive method (Daniel et al., 2013; Cetinkaya Sardan et al., 2013; Ullman, 2015) used especially in intensive care units and in many clinics (Ulger, 2006). It is used especially for parenteral nutrition, chemotherapy applications, and hemodynamic monitoring, where peripheral veins are not available, or among patients in a critical condition or who require long-term venous access (Mathers, 2011; Richardson, 2007). Various catheters are used in central venous catheterization. Intravenous catheters are named differently depending on their length, settlement,

and duration of use (Ocal & Dolapcı, 2012; Cetinkaya Sardan et al., 2013; Bati & Ozyurek, 2015; Bodenham et al., 2016). Central venous catheters are placed in large vessels such as the subclavian, jugular, and femoral venous artery according to the patient's condition (ASA 2012).

The central catheters used have some advantages and disadvantages in terms of their settlements (Galloway & Bodenham, 2004). Central catheters placed in the jugular vein are easier to fit, and the risk of thrombosis and pneumothorax is lower. However, they limit patients' movements, are less comfortable, and the risk of infection is higher (Galloway & Bodenham, 2004; Gulmen et al, 2010). Subclavian catheters, however, are more

comfortable, pose a lower risk of complications (Galloway & Bodenham, 2004), allow the patient to move freely, and are not affected by head movements (Galloway, 2004; Tercan, 2006). However, subclavian catheters are difficult to place, and carry with them the risk of pneumothorax and hemothorax (Galloway & Bodenham, 2004).

Many complications arise from the use of central catheters, not least of which is the difficulty experienced with regard to their settlement (Aygun, 2008). These complications are reported to increase the duration of hospital stays by seven to 21 days and increase the mortality and morbidity rate (Bati & Ozyurek, 2015).

Therefore, a patient with a central venous catheter needs to be well treated and followed up by a nurse in order to improve quality of life and treatment compliance (O'Grady et al., 2011; Cetinkaya Sardan et al., 2013; Daniel, 2013). After a physician inserts a central venous catheter (Daniel 2013; Rickard et al., 2004), the nurse is responsible for catheter care (Daniel, 2013; Macklin, 2010; Rickard et al., 2004). Proper catheter care by a nurse will reduce the incidence of infections and other complications (O'Grady et al., 2011; Cetinkaya Sardan et al., 2013; Daniel, 2013; Mlinar & Raškovic Malnaršic, 2012). In addition, the care provided should be aimed at increasing patient satisfaction (Rafii et al., 2009).

Study Aim

No extant studies in the literature simultaneously compare the level of pain, comfort, and satisfaction with a catheter. In this context, our study gives a comparative view of the pain level, comfort, and satisfaction experienced by patients with subclavian and jugular catheters.

Methods

Study Design and Setting

This study was a cross-sectional. The study was conducted with a sample of 51 hospitalized patients, 26 of whom had subclavian catheters and 25 had jugular catheters. The patients were hospitalized in an educational research hospital. Required written permission was received from the education hospital's Ethics Committee.

A questionnaire was distributed to the patients asking them 16 questions about their pain, satisfaction, and comfort levels with their catheters and their medical dressings. The questionnaire was developed by the researcher in accordance with the literature and the visual analog scale to evaluate pain levels as a data collection tool.

Statistical Analysis

In the evaluation of the data and statistical analyses, the MS-Excel, SPSS for Win., Give. 15.00 (SPSS Inc. Chicago, IL, USA) package programs were used. It was shown that the number (%) of intermittent variables as a descriptive statistic, for continuous variables mean \pm standard deviation or median (least-largest values). Normal distributive suitability was assessed by the single sample Kolmogorov Smirnov test. Correspondingly, the Mann-Whitney U test or chi-square test were used for comparison between the two groups. In statistical decisions, a $p \leq 0.05$ level was accepted as a sign of significant difference.

Results

The study population consisted of 51 patients. Our research sample comprised 43.1% (n=22) female and 56.9% (n=29) male subjects. Of this number, 35.3% were high school students and 31.4% were university graduates. 64.7% of the sample was married and 31.4% were single. While 72.5% of our patients (n=37) were in surgical intensive care and surgery clinics, 27.5% of them (n=14) were hospitalized in a hematology clinic (Table 1). Subclavian central catheters were applied to 51% of the patients (n=26) and 94% of all catheters were inserted in the operating room. The lumen counts of 82.4% of the catheters was three. 72.5% of the catheters were applied for a period of between 1-10 days, while 11.8% of them remained in place for over 30 days (Table 2). In terms of pain and comfort, there was no statistically significant difference between patients with subclavian catheters and those with jugular catheters ($p > 0,05$) (Table 3). A statistically significant finding was that some patients with jugular catheters said they were afraid to move their neck, while and those with subclavian catheters were "satisfied with the location of the catheter" ($p < 0,05$) (Table 4). Patients with a jugular catheter reported that the dressing quickly became wet due to sweating ($p < 0,05$) (Table 5).

Discussion

Central venous catheters are used for different indications in hospitalized patients (Richardson, 2007; Mathers, 2011; Tekelioglu et al., 2011; Daniel et al., 2013; Ullman, 2015; Cetinkaya Sardan et al., 2013). Proper maintenance and follow-up of central venous catheters under the responsibility of a nurse affect the quality of life and clinical status of patients (Macklin, 2010). Various guidelines developed in this context are available (O'Grady et al., 2011; Cetinkaya Sardan et al., 2013).

The rate of central venous catheter use is around 61%, according to a multicenter study conducted in our country. In this study, catheter-derived bacteremia was detected at a rate of 17.6 per 1,000 catheter days (Aygun 2008).

Table1. Demographic characteristics of patients

Gender	n	%
Woman	22	43.1
Man	29	56,9
Educational Levels		
Not Literate	4	7.8
Primary School Graduate	10	19.6
Secondary School Graduate	3	5.9
High School	18	35.3
University / Postgraduate	16	31.4
Marital Status		
Married	33	64.7
Single	16	31.4
Widowed	2	3.9
Clinic		
Surgery	37	72.5
Internal Medicine	14	27.5

Table2. Catheter features used in patients

Inserted Catheter Type	n	%
Right Subklavian	20	39.2
Left Subklavian	6	11.8
Right Juguler	23	45.1
Left Juguler	2	3.9
Catheter Practice Area		
Operating Room	48	94.1
Intensive Care Unite	2	3.9
Clinic	1	2
Number of Catheter Lumens		
II	2	17.6
III	49	82.4
Catheter's Lifetime		
1-10 days	37	72.5
11-20 days	4	7.8
21-30 days	4	7.8
Over 30 days	6	11.8

Table3. Comparison of pain and comfort catheter type

	Subklavian Catheter			Juguler Catheter			p
	Least-Most	Mean	SD	Least-Most	Mean	SD	
Pain	.00-9	2.2	2.4	.00- 6.5	1.9	1.9	.808
Comfort	.00-10	7.2	3.06	0.8-10	6.2	2.4	.059

*Mann Whitney U Test

Table4: Catheter-related issues

	p*	Never		Rarely		Sometimes		Generally		Always	
		S**	J***	S**	J***	S**	J***	S**	J***	S**	J***
When I get up, I get pain in the place where my catheter is.	.537	16	17	4	5	3	3	2	0	1	0
When I move inside the bed, I get pain in the place where my catheter is.	.708	11	11	5	6	7	6	3	1	0	1
I get pain in the place where my catheter is when I get dressed	.453	16	14	4	5	4	6	2	0	0	0
I do not have pain, but its position disturbs me	.120	16	10	5	10	5	2	0	1	0	2
My catheter is drooped down constantly and opens my dressing	.084	17	7	3	8	4	5	2	4	0	1
I have pain because the catheter seams are stretched too much	.335	22	16	2	4	1	1	1	4	0	0
I am afraid of my catheter moving out when I move	.561	14	10	5	5	3	3	2	6	2	1
I am beware of moving my shoulder	.599	17	20	2	2	3	2	2	1	2	0
I am beware of moving my neck	.001	23	9	0	5	3	3	0	6	0	2
I am satisfied with the location of my catheter	.012	2	0	1	7	1	4	13	12	9	2

P*: Chi-Square Test S**: Number of Subclavian Catheters J***: Number of Jugular Catheters

Table5. Dressing- related issues

	P*	Yes		No	
		S**	J***	S**	J***
I get pain when dressing	.300	6	3	20	22
My dressing wets quickly due to sweating	.037	1	6	25	19
My dressing is constantly drooping and opening	.076	3	8	23	17

P*: Chi-Square Test S**: Number of Subclavian Catheters J***: Number of Jugular Catheters

Discussion (continuing)

Primarily catheters must be inserted in the operating room or in similar sterile conditions to prevent catheter-related infections, as outlined by the Turkish Society of Hospital Infection and Control 2013 and the Centers for Disease Control and Prevention (CDC) guidelines for the prevention of intravenous catheter infections published in 2011

(O'Grady et al., 2011; Cetinkaya Sardan et al., 2013). To reduce the risk of infection, central venous catheter insertion is not recommended at the bedside, unless the patient's condition is serious (Tasova, 2006). In this condition, infection would negatively impact the seriousness of the patient's status (Cetinkaya Sardan et al., 2013). In our study, 94.1% of the central venous catheters were found to have been inserted in an operating room

environment, in accordance with standard practice, a statistic supported by the literature (Table 2)

Pain is an unpleasant sensory and emotional experience due to current or potential tissue damage (Donati et al., 2014). After the central catheter is inserted, pain arising from the catheter or suture at the entrance site can be painful and disturbing for patients (Donati et al., 2014), even though it is an occasional occurrence. Because patients may feel comfortable during the interview (Karayavuz 2006). In our study, the mean of pain in both catheters was low, which is consistent with findings in the literature. However, the difference in pain experienced between the catheters was not statistically significant ($p>0,05$) (Table 3). Pain experienced at the site of the catheter could be due to the movement of the patient or an infection.

Central venous catheters are applied for the long-term treatment of various health problems (Mathers, 2011). Accordingly, it is important to ensure patient comfort. The concept of comfort associated with the art of nursing is complex and subjective (Cinar Yucel, 2011). Change in comfort is defined as a "situation in which the individual is experiencing discomfort as a response to a dangerous/disturbing stimulus" (Carpenito, 2005). Many invasive factors can cause pain and anxiety, which can adversely affect the comfort of an individual in a hospital. A central venous catheter (Samantaray, 2014; Bodenham, 2016; Morrison, 1998), in particular, can cause such pain and anxiety.

It is stated in the literature that the subclavian central venous catheter is better than the jugular central venous catheter in terms of patient comfort (Gulmen et al, 2010; Galloway & Bodenham, 2004). In our study, there was no statistically significant difference in patient comfort between both catheters ($p>0,05$) (Table 3). However, there was a statistically significant difference in satisfaction with the location of the catheter between patients with subclavian catheters and those with jugular catheters ($p<0,05$) (Table 4). In this context, the study can be re-evaluated by increasing the number of samples.

In order to prevent intravenous catheter infections, it is necessary to prevent contact between the catheter entry site and the external environment (O'Grady, 2011; Cetinkaya Sardan et al., 2013). Therefore, various materials such as sterile gauze and transparent cover are used as catheter dressings (O'Grady et al., 2011; ASA 2012; Cetinkaya Sardan et al., 2013; Macklin, 2010). These materials must be changed when they become dirty, humid, or loose (O'Grady et al., 2011; ASA

2012; Cetinkaya Sardan et al., 2013). The quality of catheter care reflects an important aspect of the quality of nursing care (Arpa et al., 2013; Karadag, 1999; Macklin, 2010). For this reason, the nurse must actively participate in the selection of the dressing (Karadag, 1999). In selecting an appropriate catheter dressing, the nurse should consider ease of application, patient satisfaction, dryness of the catheter entrance site, unrestricted patient movement, possibility of infection due to the material, and cost (Arpa et al., 2013; Karadag 1999). Our study found that the dressings in patients with jugular central venous catheters quickly became wet and open due to sweating ($p<0,05$) (Table 5). It is very important to frequently evaluate catheter dressings that are in a moving area such as the jugular vein, especially in terms of patient comfort and infection. Appropriate material should be used and dressings changed when warranted.

The literature states that patients with jugular central venous catheters, who are conscious and mobilized, are restricted to catheter-related movements, which negatively affects their comfort (Gulmen et al, 2010; Tercan, 2006; Galloway, 2004). In our study, it was determined that patients who received a jugular central venous catheter were reluctant to move their necks and thus experienced limited movement ($p<0,05$) (Table 4).

Subclavian central venous catheters may be preferred, especially among patients who are conscious, obese, short necked or who have cervical injuries because these catheters do not interfere with head and neck movements (Tercan, 2006; Patrick, 2009).

Study Limitations

The research was carried out with a small sample. The study results could be evaluated by selecting a larger sample of patients. Additionally, choosing patients who have used both catheters may have an impact on the outcome of the study and facilitate comparisons between the different catheters and their pain and comfort levels.

Conclusion

This study highlights the importance of ensuring appropriate maintenance and follow-up of central venous catheters in patients' treatment process. In this process, many factors, such as infection, pain, patient comfort, satisfaction, and personal preference affect patients' compliance with treatment. All these factors should be evaluated, and the clinical situation and satisfaction of the patients should be considered. Therefore,

subclavian catheter may be preferred instead of jugular catheter in the use of central venous catheter to increase patient satisfaction and quality of care.

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