



Case Report

Intervention of trans radial band in reducing the risk of bleeding (hematoma) in patient post percutaneous coronary intervesion in King Saud Medical City

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Abstract

Cardiac catheterization is a procedure to diagnose and evaluate coronary arteries. At the end of the procedure, the radial sheath was removed and pressure was applied both manually and mechanically to the radial artery to control bleeding until hemostasis was achieved. Inadequate compression technique on the access site of the radial artery can result in haemorrhage, hematoma, pseudo aneurysm, radial artery occlusion, and tissue ischemia. Complications of hematoma are often encountered in post-PCI patients with the method of manually applying pressure/compression to the area after the trans-radial puncture followed by a feeling of discomfort for the patient after the PCI procedure. This study aims to see the effectiveness of the TR Band as an alternative to manual compression in reducing the risk of bleeding (hematoma) in the radial artery and increasing patient comfort by using the TR Band. This case study design uses a descriptive approach to nursing care with 1 respondent with inclusion criteria for clients aged over 18 years, clients after percutaneous coronary intervention (PCI) using radial access, clients using TR Bands, clients who do not have hearing loss, can communicate verbally and cooperatively, clients with stable hemodynamic conditions after PCI, clients with normal blood coagulation laboratory results, clients receive heparin anti-coagulation of at least 5,000 IU. TR Band is carried out for 1 shift with a time of 165 minutes. Measurement of the hematoma scale after cardiac catheterization with radial access using the EASY TRIAL and the use of an oxygen saturation measurement tool (pulse oximetry). The results of this case study show that complications of hematoma with Trans Radial Band intervention in patients after cardiac catheterization did not occur. Trans Radial Band intervention is effective in reducing the risk of bleeding (hematoma) in patients after catheterization.

INTRODUCTION

The Global Burden of Diseases, Injuries, and Risk Factors Study, 2017 estimates that the largest increase in the number of deaths in non-communicable diseases due to cardiovascular disease. Data shows that

globally there has been an increase in the death rate from 7.30 million to 8.93 million that occurred between 2007 and 2017 which was caused by coronary heart disease.¹ Coronary heart disease (CHD) is a disorder of heart function due to lack of blood in the heart muscle due to blockage or

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narrowing of the coronary arteries due to damage to the lining of the blood vessel walls (Atherosclerosis).² Coronary heart disease (CHD) is a progressive occlusive disorder that generally results in a decrease in coronary blood flow. This reduction in blood flow is demonstrated clinically in the presence of angina and acute myocardial infarction (AMI). AMI is classified based on the results of a 12-lead cardiac recording chart that records and measures electrical activity in the heart, which is called an ECG (Electrocardiography), which is divided into 2 categories, namely STEMI (ST Elevation Myocardial Infarction) and NSTEMI (Non ST Elevation Myocardial Infarction). STEMI is a total occlusion of the coronary arteries that causes a wider area of infarction covering the entire thickness of the myocardium as indicated by ST segment elevation on the ECG. NSTEMI is a partial occlusion of a coronary artery without involving the entire thickness of the myocardium so that there is no ST segment elevation on the ECG.³ Coronary revascularization action is one way to treat coronary heart disease with invasive procedures such as Angiogram, Percutaneous Coronary Intervention (PCI). PCI is an action to reduce angina and myocardial ischemic level with or without ST segment elevation. PCI has been shown to improve the survival of patients with coronary heart disease in addition to pharmacological interventions. The PCI procedure can be carried out through two vascular accesses, namely the radial and the femoral. Complications arising from PCI procedures are coronary artery complications and complications related to vascular access. Coronary artery complications that can occur during PCI procedures include dissection and sudden blood vessel closure (spasm), while complications after PCI procedures, intramural hematoma, perforation, air embolism, side branch occlusion, stent failure to inflate, stent thrombosis, stent infection, coronary spasm, no reflow phenomenon. Complications related to vascular access that can occur include

retroperitoneal bleeding, pseudo aneurysm, AV fistula, infection, hematoma, neuropraxia, ischemia of the lower extremities, dissection. Complications in radial access include compartment syndrome, sterile abscess, pseudo aneurysm, perforation or injury to blood vessels, severe vasospasm which is at risk of death.⁴ In May 2015 to January 2017 There were 2,233 AMI patients in Saudi Arabia, divided into 1,471 (65.9%) patients with a diagnosis of STEMI and 762 (34.1%) patients with a diagnosis of NSTEMI. Primary PPI procedures were performed in 42.5% of patients with STEMI. Of all PCI cases, 48.2% were carried out via radial access using the TR Band intervention. The results showed that the rate of vascular complications using the radial access was lower (1.4%) compared to the femoral access (3.7%). Radial access can minimize bleeding, besides that patients with radial access have fewer adverse clinical events compared to femoral access.⁵

Research conducted on groups of patients who use TR Bands shows that the incidence of RAO (Radial Artery Occlusion or occlusion complications that occur in the radial artery area after PCI procedures with radial access) is lower compared to using manual compression which takes longer, and requires personnel and does not allow full control of the hemostatic process in patients after cardiac catheterization.⁶ In another study TR Band is also effective for treating patients with a radial artery venous fistula after an AVF (Arteriovenous Fistula) installation procedure, namely a permanent vascular access created by connecting an artery with a vein through a surgical operation under the skin, usually in patients with Hemodialysis.) through radial access without occlusion of blood vessels, and without repeated occlusion or relapse.⁷ Research conducted on post PCI patients through ulnar access proved that the TR Band intervention was very effective in achieving patent hemostasis for the radial and ulnar arteries. After 7 days after the procedure, there were no adverse

complications such as ulnar artery occlusion, nerve injury or hand ischemia.⁸

From the several studies above which show the effect of Trans Radial Band intervention in post IKP patients in reducing the risk of bleeding (hematoma), the authors interested in implementing the "Trans Radial Band Intervention in reducing the risk of bleeding (hematoma) in post cardiac catheterization patient in the Cardiac Catheterization Laboratory Room in King Saud Medical City (KSMC).

METHOD

The design used was a case study using a nursing care approach with individual targets using radial access and TR Band intervention to reduce the risk of bleeding (hematoma) after percutaneous coronary intervention for 1 shift in 165 minutes where similar research had been done before. Data collection methods on nursing care were obtained through interviews, observation and physical examination. The data collected is related to assessment data, nursing diagnoses, interventions, implementation and evaluation. The analytical method used is descriptive data analysis method by describing the results of nursing care with individual targets with the application of TR Bands in reducing the risk of bleeding (hematoma) in patients after Percutaneous Coronary Intervention.

The patient in this case study were patients who had undergone a cardiac catheterization procedure at KSMC, namely patient Mr. with the age of 47 years. Prior to the TR Band intervention, interviews and education were carried out regarding the TR Band. The next researcher conducted a TR Band intervention for 1 day in 165 minutes. Collect data on the results using the EASY Trial and monitor oxygen saturation on the patient's right finger after PCI. The process of implementing the research intervention was carried out on June 30 2022 at KSMC. The sample selection criteria consisted of inclusion and exclusion

criteria. Inclusion criteria are clients over 18 years old, post cardiac catheterization clients with radial access, clients using TR Bands, clients who do not have hearing loss, can communicate well verbally and cooperatively, clients with stable hemodynamic conditions after PCI, clients with laboratory results normal blood coagulation, the client receives heparin anti-coagulation of at least 5000 IU. Exclusion criteria for patients with hearing loss, unable to communicate properly due to language barriers and clients with mental disorders, clients with femoral access, clients with blood coagulation laboratory results that are higher than normal standards.

Before and after the TR Band intervention, observations were made in the radial area where the TR Band was attached, monitoring oxygen saturation in the right hand area where the TR Band was attached and checking patient files to find out the type and dosage of drugs used during the PCI procedure. This action aims to allow researchers to know whether there is a risk of bleeding (hematoma) or not both before and after the intervention. The patient was intervened with a 3cc TR Band aspiration after being observed for 120 minutes after the PCI, followed by a 3 cc TR Band aspiration every 15 minutes until the TR Band was completely released, where the TR Band protocol is in accordance with the SOP contained in the IPP (Interdisciplinary Policy and Procedure) with the number IPP-KSMC-028-V3 which consists of 25 pages with the title Percutaneous Coronary Intervention and Coronary Stenting. This IPP refers to the standards that have been set.⁹ On page 8 of this IPP sheet there is a protocol or SOP regarding TR Band post PCI intervention in KSMC includes observation and evaluation after TR Band removal to determine whether bleeding (hematoma) has occurred with the same measuring instrument. The equipment needed is TR Band set, Easy Trial sheet and Interdisciplinary Procedure (IPP) sheet and stationery, saturation meter.

RESULT

The case study was carried out on Mr. A respondent who was treated in the Recovery Cardiac Catheterization Laboratory room with a diagnosis of Inferior Wall MI post lysis was male, had a junior high school education or equivalent. The results of the study conducted on Mr. A on June 30, 2022 shows Mr. A works as a cleaning service in a private company, 47 years old, lives in a company dormitory, is Muslim, it appears that the TR Band is installed in the radial area of the right hand with the amount of air in the 12 cc TR Band balloon, the client is post-CAG, PCI in the right coronary artery or RCA (Right Coronary Artery), the client received an intra-arterial injection of Heparin 5000 IU, the client received a Reteplase injection of 20 units, the client received an injection of 2 mg verapamil and an injection of 200 mcg Nitroglycerin intra-arterial, an injection of

Nitroglycerin 400 mcg intra coronary, visible traces of sheath puncture no.6 on area of the radial artery of the right hand, the client appears to have an oxygen saturation device installed on the ring finger of the right hand with an oxygen saturation of 96%. Based on the data analysis, a nursing problem emerged, namely the risk of bleeding (D. 0012) associated with invasive procedures.^{10,11} Nursing implementation carried out on Mr. A is an intervention using the Trans Radial Band for 165 minutes.

The results of chart 1 show the administration of the TR Band intervention for 165 minutes showing no bleeding or an area of hematoma in the radial area of the client's right hand that is attached to the TR Band.

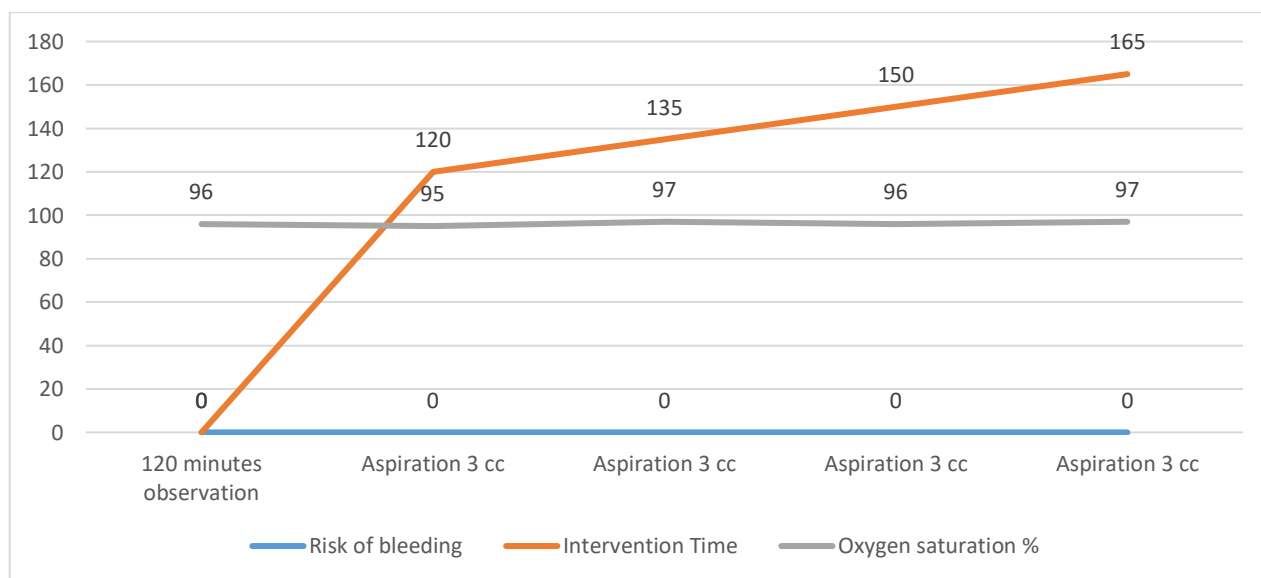


Chart 1
Risk of bleeding (hematoma) in Mr. A with the intervention using the Trans Radial Band in the Cath lab room, KSMC, Riyadh Saudi Arabia

DISCUSSION.

The review process in this research case used the Gordon assessment format in a systematic way following the existing

assessment format. In addition, the Gordon assessment format is very suitable for use in the hospital environment, this is because the data obtained is systematic, complete and includes demographic data, general

data, examination physical health function patterns data, and diagnostic examinations. In this case study there was a difference found with the theory where the results of the physical examination on Mr. A did not find an increase in JVP in the neck area and also in the results of the physical examination of the heart area there were no additional S3 or S4 sounds where according to the theory patients with AMI had increased JVP and the presence of additional S3 and S4 heart sounds.³ In the case of Mr. A nursing diagnoses that appears also has a difference with the theory they are risk of bleeding and risk of infection. In the theory of nursing diagnoses appear are acute pain, decreased cardiac output, anxiety, lack of knowledge and ineffective tissue perfusion, activity intolerance, risk of excess fluid.¹¹

This difference in nursing diagnoses also brings about differences in the stages of intervention and implementation and evaluation in nursing care that arise based on assessment data and nursing diagnoses found in this case. The results of this case study indicate that the TR Band intervention for Mr. A which was carried out for 165 minutes was able to prevent the risk of bleeding (hematoma) in post PCI patients in accordance with the results of the implementation that had been carried out from the patient Mr. A, there is no risk of bleeding (hematoma).

The results of the same study were also found in patients with complications of radial arteriovenous fistula. Where complications occur after 14 days, post installation of AVF access (Arteriovenous Fistula), with the application of intervention using TR Band 10 cc continuously for 24 hours, showing the radial arteriovenous fistula disappears completely without causing any occlusion of the radial vessel or relapse.⁷ The same intervention method but with a different SOP was carried out in post IKP patients where the SOP used was the use of a 2cc TR band aspiration protocol after 60 minutes of post IKP observation

and followed by a 2cc TR Band aspiration every 15 minutes until the TR Band was completely released showing results are the same in that no bleeding or hematoma occurs. This study also proves that the use of the TR Band in post PCI patients also has other advantages for patients including being more efficient, the TR Band in post PCI patients can simultaneously support the wrist on the hand used for radial access. Another advantage is preventing movement of the wrist after PCI which can cause bleeding (hematoma). The risk of RAO occurring which can cause ischemia in the hand area after 24 hours of TR Band intervention is lower. Patients can mobilize after the PCI, while the advantage for the medical team is that the medical team can see the post PCI radial access puncture area directly through the TR Band so that if the puncture site bleeding occurs the medical team can provide the necessary intervention, other benefits for the medical team make it easier medical team in observing whether there is bleeding (hematoma) where this advantage cannot be found in post PCI patients with manual intervention compresses.⁶

Another study comparing the use of femoral access using vascular closure devices such as star close, Proglide, Angioseal with radial access using TR Bands showed the prevalence of bleeding complications and hematomas in post PCI patients with vascular closure device via femoral access higher than radial access using TR Band. The use of TR Band is more efficient and effective in reducing the complications of bleeding and hematoma in post PCI patients.¹²

The research method was by comparing the shorter TR Band aspiration intervention time in the two groups of TR band patients. The first group of patients performed aspiration or the TR Band protocol faster, namely 20 minutes after post PCI observation, while the second group of patients started the TR Band intervention 60 minutes after post PCI observation with

the same TR Band protocol, namely the first 2cc TR Band aspiration intervention followed by aspiration 2cc every 15 minutes to 120 minutes, taking into account the amount of anti-platelet and anti-coagulation that the client receives during PCI with the result of speeding up the intervention time TR Band can be used by nurses in patients with less amount of anti-coagulation used during PCI without increasing vascular complications caused by radial artery occlusion, and can reduce the risk of hematoma.¹³ The same study compared two different TR Band intervention methods on 174 respondents who were divided into 2 groups using the same TR band 16 cc of air. The first TR Band intervention group was reduced by 2 cc after 60 minutes of observation followed by a reduction of 2 cc every 30 minutes until the release of the TR Band as a whole. The second group of protocols aspiration of 4 cc of air on the TR Band was carried out after 120 minutes of observation followed by 4 cc after 15 minutes until the TR Band was completely released with the result that no hematoma occurred in all respondents, increased patient comfort and satisfaction and shorter hospitalization. patients in the hospital and speed up the patient's discharge time from the hospital.¹⁴ A similar study was carried out by comparing the two TR Band intervention methods in two groups of respondents with 13 cc of air TR Band. The first group of respondents with a 2cc TR Band aspiration intervention was carried out after 120 minutes of observation followed by 2 cc every 30 minutes until the TR Band was completely released, while the second group of respondents with a 2 cc TR band intervention was carried out after 60 minutes of observation followed by 2cc every 10 minutes until the TR Band was released all showed no bleeding in the post-puncture area, increasing patient satisfaction and the absence of pain as indicated by the results of a pain scale in the post-puncture area of 0, and reducing the patient's stay in the hospital.¹⁵

The results of other studies show that the use of TR Band intervention can overcome pseudo aneurysm complications in arterial blood vessels after PCI by applying the TR Band continuously for 24 hours successfully used with the disappearance of pseudo aneurysm complications in these patients.¹⁶

Based on the analysis of nursing actions for patients with a focus on nursing diagnoses that arise, namely the risk of bleeding (hematoma) with physical injury agents (percutaneous coronary intervention procedure (IKP) after the Trans Radial Band intervention for 165 minutes is performed, it shows that the use of TR Band can reduce the risk bleeding (hematoma) in patients after percutaneous coronary intervention.

CONCLUSION

Giving TR Band intervention for 165 minutes in post IKP patients can prevent or reduce the risk of bleeding (hematoma) in post IKP patients.

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CONFLICT OF INTEREST

Neither of the authors has a conflict of interest that would bias the findings presented here.

REFERENCES

1. Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*. 2018 Nov 10;392(10159):1736–88.
2. Hozumi T, Yoshikawa J. Coronary Artery Disease [Internet]. 3D Echocardiography. StatPearls Publishing; 2022 [cited 2023 Jan 31]. 27–35 p. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK564304/>

3. Lopez EO, Ballard BD, Jan A. Cardiovascular Disease [Internet]. StatPearls Publishing; 2022 [cited 2023 Jan 31]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK535419/>
4. (UK) NGC. Evidence review for dual antiplatelet therapy. Acute Coronary Syndromes: Evidence review A [Internet]. 2020 [cited 2023 Jan 31];331. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK565353/>
5. Alhabib KF, Kinsara AJ, Alghamdi S, Al-Murayeh M, Hussein GA, AlSaif S, et al. The first survey of the Saudi Acute Myocardial Infarction Registry Program: Main results and long-term outcomes (STARS-1 Program). PLoS One [Internet]. 2019 May 1 [cited 2023 Jan 31];14(5):e0216551. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0216551>
6. Neto SA, de Freitas JO, Berti SL, Costa JR, Zbeid JAL. Comparison of conventional compressive dressings vs. wristband devices after catheterization by radial approach. Revista Brasileira de Cardiologia Invasiva (English Edition). 2015 Oct 1;23(4):271–5.
7. Hashimoto S, Shiraishi J, Kimura M, Nishikawa M, Yanagiuchi T, Ito D, et al. Usefulness of continuous compression using TR Band™ for radial arteriovenous fistula following transradial intervention. J Cardiol Cases. 2015 Dec 1;12(6):192–4.
8. Aoi S, Gonzalez C, Chan D, Kwan T. Transulnar Catheterization in Patients with Failed Ipsilateral Transradial Access: Novel TR Band Modification for Dual-Site Hemostasis. Cardiovascular Revascularization Medicine. 2021 Jan 1;22:84–8.
9. Terumo Medical Corporation. TR Band Application and Removal Guidelines [Internet]. Terumo Medical Corporation. 2019 [cited 2023 Jan 31]. p. 1–2. Available from: <https://www.terumo.com/content/dam/terumo-www/global-shared/terumo-tis/en-us/product-assets/tr-band/TR-Band-Application-Guidelines.pdf>
10. PPNI. Standar Diagnosis Keperawatan Indonesia (SDKI). Jakarta: DPP PPNI; 2016.
11. Gordon M. Manual of nursing diagnosis. Jones & Bartlett Publishers; 2014.
12. Kim SH, Behnes M, Baron S, Shchetynska-Marinova T, Tekinsoy M, Mashayekhi K, et al. Differences of bleedings after percutaneous coronary intervention using femoral closure and radial compression devices. Medicine [Internet]. 2019 May 1 [cited 2023 Jan 31];98(20). Available from: [/pmc/articles/PMC6531194/](https://pubmed.ncbi.nlm.nih.gov/31194/)
13. Dangoisse V, Guédès A, Chenu P, Hanet C, Albert C, Robin V, et al. Usefulness of a Gentle and Short Hemostasis Using the Transradial Band Device after Transradial Access for Percutaneous Coronary Angiography and Interventions to Reduce the Radial Artery Occlusion Rate (from the Prospective and Randomized CRASOC I, II, and III Studies). Am J Cardiol. 2017 Aug 1;120(3):374–9.
14. Riyami H al, Riyami A al, Nadar SK. Comparison between two protocols for deflation of the TR band following coronary procedures via the radial route. J Saudi Heart Assoc [Internet]. 2020 [cited 2023 Jan 31];32(1):52. Available from: [/pmc/articles/PMC7640594/](https://pubmed.ncbi.nlm.nih.gov/7640594/)
15. Deuling JH, Vermeulen RP, van den Heuvel ADFM, Schurer RAJ, van der Harst P. A randomised controlled study of standard versus accelerated deflation of the Terumo radial band haemostasis device after transradial diagnostic cardiac catheterisation. European Journal of Cardiovascular Nursing [Internet]. 2017 Apr 1 [cited 2023 Jan 31];16(4):344–51. Available from: <https://academic.oup.com/eurjcn/article/16/4/344/5918860>
16. Molina-López V, Nieves-La Cruz C, Llopart-Herrera L, Mirabal-Arroyo J. Successful Treatment of Radial Artery Pseudoaneurysm After Transradial Cardiac Catheterization With Continuous Compression Therapy by a TR Band® Radial Compression Device. Cardiovascular Revascularization Medicine. 2021 Jul 1;28:227–31.