



Pre-And Post-Operative Care for Cardiac Catheterization and Complications

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Introduction

Cardiac catheterization (Coronary angiogram) is a common medical procedure that rarely results in serious complications. It is used to examine the function of the cardiac valves and arteries, as well as the cardiac muscle. It's often utilized to address a variety of heart problems. A catheter is placed into an artery or vein in the groin, neck, or arm and threaded through the blood vessels to the heart during cardiac catheterization. X-ray scans of coronary arteries, which supply blood to the heart muscle, are also part of the operation.

Catheterization of the heart

2-1-Aim

To guarantee a successful result after cardiac catheterization

2-2-Why It's Done:

- To locate coronary arteries that were narrowed or blocked due to plaque buildup.

- To determine if there is valve disease or to confirm its presence.
- To evaluate heart muscle function.
- To open up narrowed or obstructed parts of an artery by performing an arterial angioplasty.
- To determine the amount of oxygen in your heart's four chambers.
- Congenital defects in the cardiac valves or between the heart chambers must be found.
- A very little sample of heart tissue is removed to be examined under a microscope (biopsy)
- Take X-rays to assess coronary artery blockage.

2-3-How It Is Performed:

1. To numb the needle puncture site, the patient is given a local anesthetic injection.
2. A catheter is a lengthy, narrow tube that is placed into the patient's blood vessels via the groin or arm.
3. The catheter is guided into the heart's arteries.
4. The position of the catheter as it is threaded through the blood vessels and to the heart will be displayed on a computer monitor.
5. Once the catheter is inserted, a little amount of dye is given to help visualize the coronary arteries.
6. Angiography is a process that uses a catheter to inject a dye that could be seen on X-rays.

2-4- Arrangement

Caretakers	<ul style="list-style-type: none"> - "RN/LPN will give pre- and post-operative care - "CCA" Hair clipping on site is possible.
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A physician's order is necessary.	<ul style="list-style-type: none"> - Cardiac Catheterization Services Booking Request (Form #102051) must be completed by MRP or designate and sent to the Cardiac Catheterization Laboratory (Cath Lab) at RUH for inpatients at all sites. - .. The client, family, or legal guardian provides informed, written consent to the interventional cardiologist or designate.
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Particular Points to Note	<p>The Cath Laboratory will schedule outpatients and admit them to the RUH Cardiac Short Stay Unit (CSSU) on the date of the operation.</p> <p>The Nurse Clinician, Cardiac Catheterization or designate triages patients previous to the operation. If the patient is not at RUH, they may be transported to RUH CSSU, CCU, or Ward 6000 for pre-procedure.</p> <p>Patient must NPO for four hours before to the operation or as directed by the Cath Laboratory Check 3.7 for more information about drugs.</p> <p>The interventional cardiologist or designate in charge of the radial approach will examine for adequate ulnar circulation in the hand that will be used for the operation.</p> <p>The length of post-operation bed rest is dictated by the location of the procedure, the status of the access location, and the residual impacts of procedure anesthesia.</p>
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Discharge/Transfer	<ul style="list-style-type: none"> - If no consequences develop, outpatient clients may be discharged from CCU/CSSU 1 to 2 hours after ambulating. - Outpatient clients should be escorted and have transportation provided when they are discharged. - It is suggested that out-of-town patients spend the night in Saskatoon with a trustworthy adult. - After the operation, clients must not start driving for at least 48 hours. - Following 2 hours clients sent from SCH or SPH may be returned directly to the giving hospital, if there have been no consequences. (Refer to Regional Policy #7311-60-006 Patient/Client Road Transportation Guidelines) The patient will be transported by ambulance. The RN/LPN at RUH will call the RN/LPN at the sending hospital to report. Return the entire chart to the customer. (Refer to Regional Policy #7311-60-006 Patient/Client Road Transportation Guidelines) The patient will be transported by ambulance. The RN/LPN at RUH will call the RN/LPN at the sending hospital to report. Return the entire chart to the customer. - At the interventional cardiologist's discretion, out-of-town patients from referral hospitals may be transported back by ambulance after the operation.
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	<ul style="list-style-type: none"> - A copy of the discharge instructions should be given to each client. See Appendix C - Discharge After Angiogram/Percutaneous Coronary Intervention PCI Intervention.
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2-5-Interventional Procedure:

A non-surgical interventional therapy (also known as angioplasty) is utilized to unblock constricted coronary arteries and enhance blood flow to the heart. When a blockage is discovered during a diagnostic cardiac catheterization, an interventional procedure can be done immediately, or it can be scheduled after the existence of coronary artery disease has been verified. Based on the patient's condition, interventional procedures include balloon angioplasty and stent placement.

2-6-Preparing for Cardiac Catheterization:

- Inform your doctor of any medicines you're taking.
- Prior performing cardiac catheterization, be sure you have completed all of the essential examinations.
- For at least Four hrs prior the procedure, or as recommended by your doctor, don't drink or eat anything.,
- If you have an allergy to something, particularly iodine, inform your doctor.
- Do not stop using or alter the dosage of any medications without first visiting your doctor (for example, aspirin, diabetes medication, and others).
- Maintain a calm demeanor and minimize stress and anxiety.
- Be careful to take out your dentures and any jewelry you may have, particularly necklaces.

2-7-After Cardiac Catheterization, When Should You See Your Doctor?

- After one week to make sure that the wound is healing properly.
- If there is any bleeding around the catheter entry location.
- If around the catheter entry location, you may notice unusual pain, swelling, redness, or other indicators of infection
- If your feet feel cold or turn blue.
- Consult a doctor about avoiding certain activities like lifting weights for a short period following catheterization

Comfortable is the elderly procedure

If alternative techniques are available?

, An artery CT scan can be done but it is less accurate than a diagnostic cardiac catheterization. other than open heart surgery.

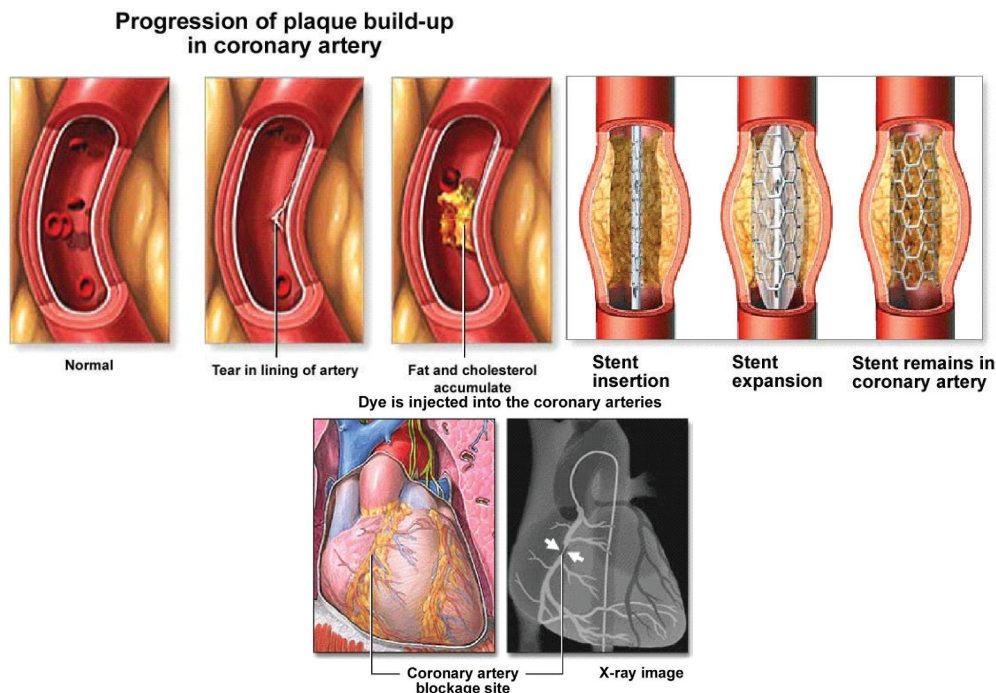


Figure (1) Progression of plaque bulid-up in corrorary artery

3-Procedure

Note: For renal protection, regular saline infusion could be prescribed. Use the Pre and Post Coronary Angiogram Protocol (form #101618) found on the back of Orders. See Appendix A for more information.

Using surgical clippers, cut the hair at the anticipated entry site (right femoral, right radial, or left radial).

Note: The site should not be shaved.

- 3.6 Take off all the client's jewelry as well as his or her contact lenses. The patient may wear eyeglasses, hearing aids, or dentures.

Note: Only hospital gowns will be worn by the patient.

3-1- Medications

- ❖ Warfarin: If the patient is on warfarin, verify with the MRP or designee about keeping it and determining whether or not he needs heparin. For the treatment to continue, the INR has to be less than 1.4.
- ❖ Heparin: On call from the cardiologist, Cath Lab Nurse Clinician, or designate, the patient's IV heparin is stopped. Examine the post-procedure orders to see if it needs to be continued. See Appendix A and B
- ❖ Oral anticoagulants such as LMWH, Dabigatran, Rivaroxaban, and others: Verify with MRP or a designee to see whether the dose can be held prior to the operation and then restarted afterward.
- ❖ Unless otherwise advised by the cardiologist, give all medications, including oral cardiac drugs, ASA, and antiplatelets. Exception: Unless the cardiologist directs differently, stop taking Metformin and Metformin-containing drugs 48 hours before the treatment. Verify with the Cath Laboratory about diuretics, insulin, and other oral hypoglycemic medications. If pre-med is required, give it "on-call" after the consent is completed.
- ❖ Send the patient to the Cath lab on a stretcher, along with the current and previous charts.

Note: During regular business hours, a Cath Lab porter will be dispatched.

3-2- Following the procedure,

Note: The patient will be transported back to the unit on a stretcher, escorted by a Cath Lab porter. At the Interventional Cardiologist's request, an RN will accompany the patient. The patient must remain on the stretcher until the femostop is removed if one is in place.

Patients who have undergone a radial approach should be transported from a stretcher to a bed with the help of a registered nurse or a licensed practical nurse.

The RN/LPN will be in charge of:

- Perform a post-procedure examination of the client's vital signs, puncture site status intactness of dressing, circulation (pulse quality), sensation and movement (CSM) on the limb distal to the access site as soon as the client returns to the unit.
- If a vascular clamp (e.g., a femostop or a TR radial band) is used, make sure it's in the right area and that enough pressure is provided.

If an arterial sheath is present, connect it to a pressure tubing/transducer and monitor the patient (refer Hemodynamic Monitoring-Arterial Line Nursing Policy #1101). It is removed by the doctor as instructed.

Note: Till the sheath is removed, these patients must proceed to CCU or CSSU.

- 3.13 Minimum vital signs should be taken (heart rate, blood pressure, respirations)

.. "Q15 min x 1 hour"

.. "Q30 min x 1 hour"

.. "Q hourly x 2 hour"

Check the access point and distal circulation for the bare minimum.

.. "Q15 min x 1 hour"

.. "Q30 min x 1 hour"

.. "Q hourly x 2 hour"

.. "Q 4 x 18 hours"

- Upon returning to the unit, the patient should resume his or her pre-procedure diet.
- Follow the doctor's orders to stay in bed. The concerned limb must be kept straight while the patient is in bed. The head of the bed can be raised 10-20 degrees for client comfort, or a reverse Trendelenburg can be utilized. The patient could log roll.

Note: The condition and placement of the access point dictate the length of bed rest.

Unless otherwise advised by the interventional cardiologist, bed rest times are as described in the following:

.. Minimum of two h after operation at the femoral access point.

.. With a closure device on the femoral access site, you can sit at 30° right away, but you must stay in bed for two h after the treatment.

.. If the nurse determines that the procedure sedation is minimal, the patient may ambulate immediately through the radial or brachial access site.

- Leave the puncture site dressing on till the next morning.

Note: The condition and placement of the access point dictate the length of bed rest.

Bed rest times are as follows unless directed otherwise by the interventional cardiologist:

.. Femoral access site: minimum of 2 hours post procedure.

.. Femoral access site with use of a closure device: may sit at 30° immediately, but on bed rest for 2 hours post procedure.

.. Radial or brachial access site: may ambulate immediately if the nurse determines the effects of the procedure sedation are minimal.

- Keep puncture site dressing in place until the following morning.

3-3-Angiogram/Percutaneous Coronary Intervention (PCI) Discharge

Medicines:

- Unless your cardiologist advises you otherwise, keep taking your existing meds.
- If you had been using Metformin (Glucophage, Avandamet, Glycon, Glumetza) for diabetes before your treatment, you should resume it two days after your procedures, unless your cardiologist instructs you differently.
- If you had been using Warfarin (Coumadin) before your treatment and are now resuming it, your INR (blood work) should be monitored by your family doctor in two to three days.
- If you've been on Dabigatran (Pradax), Rivaroxaban (Xarelto), or Apixaban (Eliquis) rting again, your family doctor may require to examine your blood work in the following days.
- This drug must be used on a daily basis. Do not discontinue taking this drug without your cardiologist's permission. Plavix prevents blood clots from developing in blood arteries and stents that have recently been implanted.
- Take an over-the-counter pain reliever if your puncture site is bothering you. (Tylenol, for instance).

3-4-Driving:

- After your treatment, you should not drive for at least 48 hrs. Depending on your specific situation, your cardiologist may impose additional limits.
- Consult your cardiologist when you can resume driving if you drive a commercial car.

3-5-Getting back to job / physical exertion:

- When you can go back to work, your cardiologist will inform you..
- For the following 5-7 days bypass big task (more than 10 lbs).
- Discuss with your cardiologist if you planning a flight tour in the coming month at least ensure you are healthy to go.
- Consult with your cardiologist if you have specific question about sexual activities.

3-6- Hygienic practices

- If your puncture location still has a dressing on it, remove it the next day. Make sure to wash gently with soap and water and allow it to air dry.
- For the next week, avoid taking a hot bath, swimming, or using hot tubs because this may cause the puncture site to bleed. You may take a shower.

Materials and methods

We assessed at 178 individuals who received diagnostic and therapeutic cardiac catheterization in a Cardiac Center between April 2018 and April 2020, ranging in age from Nineteen to 92 years old (mean, 45 ± ten years). Both the femoral and radial arteries were used as access points for cardiac catheterization. Coronary angiography, peripheral angiography, carotid angiography, temporary pacemaker insertion, percutaneous transluminal coronary angioplasty (PTCA) with stenting (including primary PTCA), and permanent pacemaker insertion are all diagnostic and therapeutic cardiac catheterization procedures (Table 1) 92% of procedures were performed using femoral artery access, while 8% were performed via radial arterial access. Following the procedure, the femoral arterial access site was physically pressured for at least Twenty min and the patient was brought to the wards with the access site leg immobilized for Six hours. In the event of radial artery access, the radial sheath was promptly removed, and the access site was pressed with a bandage. The risks of vascular problems from the procedures were assessed. Prior the procedure, both written and informed consents were obtained. Throughout catheterization and hospital stay, all periprocedural problems were documented.

Table 1: Catheterization of the heart

Procedure	Total
"Coronary angiography"	110
"PTCA stenting"	32
"Permanent pacemaker insertion"	4
"Temporary pacemaker insertion"	9
"Peripheral angiography"	23
Total	178

Results

Table 2 lists the complications that happened throughout the treatment.. Death was the most serious complication of diagnostic catheterization, occurring in two individuals (0.84 percent) out of 178. 1 patient died after a coronary angiography, and another died after PTCA stenting of the left circumflex artery due to retroperitoneal hematoma. Contrast allergy was the most frequent consequence affecting five patients (2.5 percent). Antihistamines were used to treat all of these patients. According to several studies, up to 1% of patients develop a reaction to the iodinated contrast agent. Patients with additional atopic illnesses, an allergy to seafood (which contains organic iodine), or a history of past contrast responses are at higher risk. Our individuals acquired mild contrast allergies that were simply treated medically with antihistamines.

Table 2: Complications

Death	2
Vascular complications	3
Contrast allergy	5
Vasovagal reaction	1
Pyrogen reaction	1
Contrast induced nephropathy	2

In three individuals (1.4 percent), vascular access site problems (such as groin hematoma) occurred. After a successful PTCA stenting procedure, one patient developed a retroperitoneal hematoma the upcoming day. After the treatment, 3 individuals (0.84 percent) did die. One 84-year-old individual died the next day after PTCA stenting of the left circumflex artery due to a severe retroperitoneal hematoma. The remaining 1 patient who died experienced an acute myocardial infarction with cardiogenic shock and a coronary angiography that revealed diffuse multivessel disease, making him unsuitable candidates for revascularization. Despite the fact that antibiotics are not required when cardiac catheterization is conducted with standard sterile measures, we still provide Injection. cephazolin (1 g throughout the procedure and every 8 hrs for the next 24 hrs if we execute a delayed intervention by exchanging sheaths that were inserted during an earlier diagnostic procedure or if any sterile technique break is suspected. Despite that, three individuals developed pyrogen reaction symptoms such as fever and chills (1.6 percent). One patient experienced a vasovagal reaction as an outcome of pain (0.56 percent).

Discussion

Cardiac catheterization was largely utilized to diagnose hemodynamics, ventricular function, and coronary anatomy in the 1960s and 1970s. Catheterization became a much more essential tool in the treatment of cardiovascular disease in the 1980s with the development of improved angioplasty equipment and novel interventional devices. Whether diagnostic or therapeutic, cardiac catheterization always carries the risk of both benefit and damage to the patient Based on the significance of the procedure and the severity of the disease, the tolerable ratio of one to the other

will differ. A serious consequence of diagnostic catheterization is mortality. Over the last 30 years, death as a result of cardiac catheterization has steadily decreased. The presence of a number of baseline characteristics (including NYHA class, multivessel disease, congestive heart failure, and renal insufficiency) predicted an up to eight-fold increase in major complication rates (from 0.3 in individuals with none of these conditions to 2.5 percent). Following 178 cardiac catheterization operations, our study found two deaths (0.84 percent). The risk of death from coronary angiography has decreased significantly. The death rate with coronary angiography used to be above 1% in many labs, but with the broad use of heparinization, the rate has dropped to 0.1 to 0.3 percent, relying on the case mix. 1 patient died of severe retroperitoneal bleeding of 2 deaths. After PTCA stenting on the left circumflex artery, the patient was an 84-year-old woman who had developed retroperitoneal hematoma. Despite substantial blood transfusion, the patient died. The remaining 1 patients died of severe myocardial infarction complicated by cardiogenic shock, in which a coronary angiography revealed diffuse multivessel disease and they were not suitable for revascularized candidates. A research found that 0.12% of 1,609 diagnostic catheterizations resulted in death. A vascular issue at the access site was also frequent, with three individuals experiencing it (1.4 percent). Thrombosis of the femoral artery necessitates immediate surgical action. Pseudoaneurysms are painful and can rupture. The morbidity of routine diagnostic coronary angiography has decreased as technique and technology have improved, but death appears to be inescapable. Many studies show a mortality rate of 0.1 percent to 0.2 percent. The incidence of iatrogenic arteriovenous fistula was reported to be 0.86 percent in a total of 10,271 consecutive patients undergoing cardiac catheterization who were followed up prospectively over a three-year period. High heparin dosage, coumadin medication, puncture of the left groin, arterial hypertension, and female gender were found as independent risk factors for arteriovenous fistula.

However, Pseudoaneurysms and arteriovenous fistulas are not common in our patients.

According to several researches, up to 1% of patients develop a reaction to the iodinated contrast agent. Patients with additional atopic illnesses, an allergy to seafood (which contains organic iodine), or a history of past contrast responses are at higher risk. Five patients experienced a contrast allergy (2.5 percent). All five patients had a mild case of it. In the catheterization laboratory, the rate of contrast media problems is 0.23 percent, with one death every 55,000 procedures. 1 Although anaphylactoid reactions are not immune-mediated, histamine release and other mediators cause a clinical appearance that is similar to that of anaphylaxis.

Conclusions

Even in their early stages, both diagnostic and therapeutic cardiac catheterization procedures in cardiac centers have acceptable low consequences. Low consequences assure not only patient safety and comfort, but also lower expenses and increase cardiac catheterization efficiency.

References

- 1- Schueler, A., Black, S. R., & Shay, N. (2013). Management of transradial access for coronary angiography. *Journal of Cardiovascular Nursing*, 28(5), 468-472.
- 2- Puspasari, S. Patient ambulation Post Transluminal Coronary Angioplasty percutaneous actions.
- 3- Merriweather, N., & Sulzbach-Hoke, L. M. (2012). Managing risk of complications at femoral vascular access sites in percutaneous coronary intervention. *Critical Care Nurse*, 32(5), 16-29.
- 4- Advisory, P. P. S. (2007). Strategies to minimize vascular complications following a cardiac catheterization. *PA PSRS Patient Saf Advis*, 4(2), 58-63.
- 5- Tagney, J., & Lackie, D. (2005). Bed-rest post-femoral arterial sheath removal—what is safe practice? A clinical audit. *Nursing in critical care*, 10(4), 167-173.

- 6- Vati, J., Kaur, R., & Sharma, Y. P. (2015). A Methodological Study to Develop and Evaluate Usability of a Nursing Checklist for Patients Undergoing Cardiac Catheterization. *i-Manager's Journal on Nursing*, 5(2), 19.
- 7- Davidson, C. J., & Bonow, R. O. (1997). Cardiac catheterization. *Libby P*, 10.
- 8- Wyman, R. M., Safian, R. D., Portway, V., Skillman, J. J., Mckay, R. G., & Baim, D. S. (1988). Current complications of diagnostic and therapeutic cardiac catheterization. *Journal of the American College of Cardiology*, 12(6), 1400-1406.
- 9- Dorros, G., Cowley, M. J., Simpson, J., Bentivoglio, L. G., Block, P. C., Bourassa, M., ... & Williams, D. O. (1983). Percutaneous transluminal coronary angioplasty: report of complications from the National Heart, Lung, and Blood Institute PTCA Registry. *Circulation*, 67(4), 723-730.
- 10- Kennedy, J. W. (1982). The Registry Committee of the Society for Cardiac Angiography: Symposium on Catheterization Complications. Complications associated with cardiac catheterization and angiography. *Cathet Cardiovasc Diagn*, 8, 5-11.
- 11- Morton, B. C., & Beanlands, D. S. (1984). Complications of cardiac catheterization: one centre's experience. *Canadian Medical Association Journal*, 131(8), 889.
- 12- Baim, D. S. (2006). Grossman's cardiac catheterization, angiography, and intervention.
- 13- Laskey, W., Boyle, J., & Johnson, L. W. (1993). Multivariable model for prediction of risk of significant complication during diagnostic cardiac catheterization. *Catheterization and cardiovascular diagnosis*, 30(3), 185-190.
- 14- Chandrasekar, B., Doucet, S., Bilodeau, L., Crepeau, J., deGuise, P., Gregoire, J., ... & Pasternac, A. (2001). Complications of cardiac catheterization in the current era: a single-center experience. *Catheterization and cardiovascular interventions*, 52(3), 289-295.
- 15- Dubey, L., & Sharma, S. K. (2012). Cardiac catheterization and complications: initial experience. *Journal of College of Medical Sciences-Nepal*, 8(2), 1-6.