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RESEARCH ARTICLE

PERICARDIAL PUNCTURE: WHEN AND HOW?

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Abstract

Pericardial effusion is a very common condition, due to the accumulation of fluid in the pericardial cavity (the impact depends on the volume, rate of accumulation and elasticity of the pericardium), it results in a:

1. Increased intrapericardial pressure.
2. Increase in intracardiac pressure
3. Decrease in ventricular filling
4. Decrease in ejection volume
5. Decrease in cardiac output

The etiologies of effusions are diverse.

Tamponade requires emergency decompression of the pericardium to achieve hemodynamic stabilization. Two techniques are possible, either percutaneous puncture with or without ultrasound guidance, or surgical drainage. The choice of drainage method depends on the medical-surgical teams, their experience with each method and the etiology.

Introduction:-

Pericardial effusion is a very common condition, due to the accumulation of fluid in the pericardial cavity (the impact depends on the volume, rate of accumulation and elasticity of the pericardium), it results in a:

- Increased intrapericardial pressure.
- Increase in intracardiac pressure
- Decrease in ventricular filling
- Decrease in ejection volume
- Decrease in cardiac output

The etiologies of effusions are diverse:

Médical:

- Neoplasia
- Idiopathic (viral?)
- Uremia
- Acute myocardial infarction.
- Diagnostic procedures.
- Bacteria

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- Tuberculosis
- Radiation therapy
- Myxedema
- Aortic dissection
- Post pericardiotomy syndrome
- Systemic lupus erythematosus
- Cardiomyopathy and anticoagulation

Surgical :
- Traumatic
- Post heart surgery (clot)

In the presence of a pericardial effusion, two essential questions arise: what is the origin? Is there a tamponade? Clinical data and echocardiography provide an answer to these two questions, making it possible to classify patients according to their severity and potential evolution.

Tamponade requires emergency decompression of the pericardium to achieve hemodynamic stabilization. Two techniques are possible, either percutaneous puncture with or without ultrasound guidance, or surgical drainage. The choice of drainage method depends on the medical-surgical teams, their experience with each method and the etiology.

And of course, after the pericardial puncture, it is necessary to perform a biochemical, bacteriological and cyto-pathological analysis of the puncture fluid in order to orient the etiological diagnosis.

Pericardial puncture is never justified for diagnostic purposes.

There is no known contraindication to pericardial aspiration.

Patient's Installation:
1. Ideally, but not exclusively, pericardial puncture procedures are performed in a special procedure room or cardiac catheterization room. Pericardial puncture is a sterile procedure.
2. The patient is placed in a half-sitting position as he/she does not tolerate lying down.
3. Cardiac defibrillator ready to use.
4. The patient must be monitored throughout the procedure: ECG, non-invasive blood pressure, peripheral arterial oxygen saturation and central venous pressure (if available).
5. The procedure requires surgical aseptic conditions: surgical hand washing, sterile dressing of the operator, skin antisepsis and sterile drapes.
6. The operator is placed on the right side of the patient and his assistant in front of him.
7. A local anesthesia is used, except in case of extreme emergency.

Material to be used:
- Puncture needle: Palmer trocar type, lumbar puncture needle, about 120 mm, syringes, tubes for cytobacteriological samples;
- Mask, sterile gloves, gown, drapes, antiseptics.

Technique:
1. The operator uses the Marfan's route by puncturing under the tip of the xiphoid, classically in the left xiphocostal angle,
2. Then introducing the needle by grazing the posterior face of the sternum, heading up and slightly outwards, towards the left shoulder at a 45° angle to the skin plane. The echocardiography sensor can be stabilized at the tip of the heart in four-chamber incidence, allowing permanent guidance of the procedure.
3. The trocar or needle, advanced with the vacuum in hand, perceives the pericardial resistance that precedes the appearance of the liquid in the syringe.
4. The evacuation of about 20 to 30 ml allows to decompress the right cavities and to stabilize the patient.
5. Then the trocar is removed with the vacuum in hand.

6. Once access to the pericardium is confirmed, the J-wire is inserted through the needle into the pericardial space. The guide wire should not be forced. It should pass without resistance.
7. While holding the wire in place, remove the needle from the guidewire. Pass the dilator over the guidewire, dilating the subcutaneous tissue, diaphragm and pericardium.
8. Remove the dilator and pass the drainage catheter over the guidewire, then place the catheter in the pericardial space.
9. Note that the guidewire must always extend beyond the catheter tip. A portion of the guidewire should always extend beyond the catheter hub during placement.
10. Once the catheter is in position, remove the guidewire leaving the catheter in place.
11. Attach the three-way valve to the female Luer tip of the catheter.
12. Pericardial fluid samples can be taken at this point.
13. After sampling, the drainage bag can be attached to the three-way valve to collect the fluid.
14. If the catheter is to be left in place for a period of time, secure the catheter to the skin and dress the site according to the hospital's protocol.
15. If the catheter is to be removed, gently remove it and dress the site.
16. Catheter occlusions by coagulation of pericardial effusions can be reduced by interrupting catheter drainage every 4 to 6 hours.

Post puncture monitoring:
During the first few hours after drainage, pulse (and central venous pressure if available), blood pressure, and arterial oxygen saturation are monitored regularly. Clinical examination confirms the disappearance of signs of tamponade. Cardiac echocardiography is used to show the effectiveness of the drainage and the absence of repercussions on the cardiac cavities.

Complications:
Complications and/or risks associated with pericardial puncture procedures may include:
1. Catheter occlusion,
2. Infection,
3. Cardiac tamponade by perforation,
4. Atrial and ventricular arrhythmias,
5. Laceration of coronary vessels or cavity wall,
6. Injection of air into the cardiac cavities,
7. Pneumothorax, hemothorax
8. Hypotension (possibly reflexogenic).
9. The risk of perforation of the stomach, colon, atrium and/or right ventricle should also be taken into account.

In general, hemostasis is spontaneous after removal of the needle. Naturally, clinical, radiological and ultrasound monitoring is required after such an incident.

Conclusion:-

Pericardial puncture is used to decompress the heart in cases of tamponade. The puncture of a few milliliters of fluid is usually enough to dramatically improve hemodynamics.

It is a procedure that requires rigorous aseptic conditions.

In 20 years, the technique of percutaneous echo-guided drainage has progressively imposed itself by the safety it brings, by the simplicity of its implementation and because of its efficiency, comparable to that of surgical drainage.

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