

## SOP: Corpus Cavernosum Assessment (Cavernosography/Cavernosometry)

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DOI: 10.1111/j.1743-6109.2012.02795.x

### ABSTRACT

**Introduction.** There is no universal gold standard diagnostic test to differentiate psychogenic from organic erectile dysfunction (ED). Cavernosography/cavernosometry has been used to evaluate veno-occlusive dysfunction (VOD) in men with a proposed organic ED.

**Aim.** To develop evidence-based guidelines for the performance and interpretation of cavernosography/cavernosometry.

**Methods.** Review the methodology behind cavernosography/cavernosometry and evaluate the evidence that supports its use and interpretation of results.

**Main Outcome Measure.** Expert opinion based on review of the literature, extensive internal committee discussion, public presentation, and debate.

**Results.** The detailed technique of cavernosography/cavernosometry is described. An evidence-based perspective to the use and interpretation of cavernosometry is presented.

**Conclusion.** The positive predictive value of cavernosometry still needs further assessment. It is unknown how many potent men would test positive for VOD (false positive). **Glina S and Ghanem H. SOP: Corpus cavernosum assessment (cavernosography/cavernosometry). J Sex Med 2013;10:111–114.**

**Key Words.** Cavernosometry; Cavernosography; Corpus Cavernosum Assessment; Venogenic; Erectile Dysfunction

### Introduction

Currently, there is no universally accepted gold standard diagnostic test to differentiate psychogenic from physical ED. Instead, sexual health specialists rely on a detailed history, a focused physical examination, and specialized diagnostic tests to decide if the etiology of the ED is mainly psychogenic or mainly organic (physical). Venous-occlusion dysfunction (VOD) is an organic cause of ED and it occurs when an abnormal venous drainage prevents a rigid erection in the presence of a normal or abnormal penile arterial flow. VOD can be diagnosed by an abnormal cavernosometry and the site of the “leakage” can be assessed through cavernosography.

### Indication

Cavernosometry is generally employed in young men—who are already diagnosed to have ED that is

mainly organic—to diagnose a VOD. Cavernosography is indicated in those patients who might be candidates for penile vascular surgery to correct a veno-occlusive leak and in men who have Peyronie’s disease with poor rigidity before penile reconstructive surgery to assess the site of the “leakage” [1].

### Brief History

The first proposed cavernosometry, carried out with a pump without the use of vasoactive medication, recorded the flow needed to obtain, and to maintain, an erection; high flows indicated that there was a leakage [2]. Once the ability of papaverine to induce an erection was learned, those flows were recorded after intracavernosal injection of this drug, called pharmaco-cavernosometry [3]. The goal was to induce relaxation of the smooth muscle and lower the negative impact of the adrenergic system over the cavernous trabeculae and sensitize the results.

More recently, it was described as gravity cavernosometry, which records the equilibrium intracavernous pressure after injection of vasoactive drug and submitted to a constant infusion with a pressure of 100 mm Hg [4]. Finally, it was proposed that dynamic infusion cavernosography and cavernosometry (DICC) records a drop of intracavernous pressure after reaching a supraphysiological pressure [4].

## Methods

There is no gold standard test for the diagnosis of VOD. DICC has been the most employed and can additionally evaluate the venous occlusion function and the arterial inflow to the corpus cavernosum [5]:

- Intracavernous injection of vasoactive drugs, with redosing when needed [6]
- Two punctures in the corpora cavernosa
- Peristaltic pump to maintain intracavernosal pressure (ICP) at 90 mm Hg
- 50–100 mL of non-ionic contrast
- X-ray in four positions

## Procedure [6]

- Two intracavernosal angio-catheters are placed (19- to 21-gauge butterfly needles) under local anesthesia (1% plain xylocaine).
- One catheter is attached to a pressure transducer to record intracavernous pressure change.
- The second catheter is attached to heparinized saline through a controlled pump to deliver the required rate of injection fluid. Patients are injected through one of the intracavernosal catheters with vasoactive drug (prostaglandin E1 or combination of prostaglandin E1, papaverine, and phentolamine).

## Recordings

Ten minutes following the first dose of the medication, the following parameters are recorded:

1. Equilibrium pressure within the corpus cavernosum: assessment of the ICP development within the corpus cavernosum (measured in mm Hg), known as equilibrium pressure.
2. Cavernosal artery occlusion pressure (CAOP): assessment of cavernosal artery inflow gradients (measured in mm Hg), which is the difference between brachial artery systolic pressure and the CAOP (the ICP at which a Doppler signal is lost on the cavernosal artery).

3. Flow-to-maintain (FTM) value, measured in mL/minute, defined as the flow of saline required to maintain a fixed ICP.
4. Pressure decay (PD) defined as the pressure drop occurring over a 30-second period after raising the ICP to 150 mm Hg.

## Normal Values

- CAOP: <30 mm Hg
- FTM: <20 mL/minute
- PD: The rate of drop should be <40 mm Hg in the first half minute.

## Redosing

If either FTM or PD values are abnormal, the patient undergoes redosing. After redosing, all four parameters were re-recorded 5 minutes after medication administration. This protocol was repeated until a maximum of three doses of intracavernosal agent had been administered. There is evidence that 70% of patients require a second injection and 30% require a third injection to induce a complete relaxation of the smooth muscle [6].

## DICC

If cavernosometry demonstrates corporal veno-occlusive dysfunction and there is an indication to find the “leakage” site, a radio-opaque dye is injected I.C. (intracavernous) replacing the saline infusion. An X-ray picture is then taken to demonstrate the site of venous leakage, any abnormal veins, or any other pathology within the corpora cavernosa, such as fibrous plaques.

## Comparison

A prospective randomized study compared all the methods in similar patients and found that the correlation between pharmaco-cavernosometry and gravity cavernosometry was 91.7%, between pharmaco-cavernosometry and DICC was 71.54%, and between gravity cavernosometry and DICC was 74.8% [7].

## Evidence-Based Perspective for Its Use

Once a diagnostic test has been ordered, the physician must be aware and educate the patient about the accuracy of a test. A diagnostic test with frequent false-positive results (low specificity) could lead to a serious psychological setback if a young man is informed, erroneously, that his ED is primarily physical, thus requiring lifetime therapy or surgery. On the other hand, a test with frequent false-negative results (low sensitivity) might miss a

physical condition that is frequently associated with life-threatening conditions in older men.

#### Assessing the Performance of a Diagnostic Test

The assessment of a diagnostic test requires comparison of its performance against an accepted reference test known as a gold standard test. However, in some conditions (e.g., angina pectoris and ED), no gold standard test is available.

The issue is further complicated when the gold standard test is not perfect [6,8].

#### Likelihood Ratio

A practical concept within evidence-based medicine to express the usefulness of a diagnostic test in predicting the probability of a disease is through the calculation of the likelihood ratio (LR). The LR is the likelihood that a given test result would be expected in a patient with a disease compared to the likelihood that the same result would be expected in a patient without that disease.

#### Shortcomings of Cavensometry/Cavernosography

- Moderately invasive
- Unknown positive predictive value
- Unknown LR
- Lack of standardization of the parameter
- Anxiety/sympathetic overtone might lead to false-positive results [9].
- Up to now, it is not possible to record if there is a complete smooth muscle relaxation even after the intracavernous injection of a vasoactive drug and sexual stimulation [10].
- A false-positive diagnosis results in serious erroneous advice or procedures.

#### Conclusion

The positive predictive value of cavensometry still needs to be assessed. It is still unknown how many normal potent men in the general population would test positive for the so-called venous leak.

#### Recommendations

- Cavensometry/cavernosography should not be primarily used to establish a physical etiology for ED.
- Cavensometry should only be performed in specific indications where it would influence the treatment plan in patients failing to respond to oral/local therapy. Cavernosography is reserved for when there is a diagnosis of VOD and reconstructive surgery has been planned.

- A mainly physical etiology should be documented prior to cavensometry/cavernosography through a detailed medical examination (exploring risk factors), sexual history, a focused physical examination, and documentation of the complete absence of full erections whether during sleep, sexual/masturbatory stimulation, and intracavernous injections of vasoactive drugs with redosing prior to audiovisual or sexual stimulation.
- Cavensometry/cavernosography should be performed only after the intracavernous injection of vasoactive drugs, with redosing when necessary.

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*Conflict of Interest:* The authors report no conflict of interest.

#### Statement of Authorship

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- (a) **Final Approval of the Completed Article**  
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