

# Cold Knife Conization: Technique and Results

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Kersti Kukk, MD  
Liidia Gristenko, MD

## Introduction

Procedures similar to present-day conization were used in the early 19<sup>th</sup> century in an attempt to excise gross cervical tumors per vaginam. During the second half of the 20th century, conization evolved as an important tool for diagnosing the cause of positive cervical cytology in women without visible lesions and, later, as treatment of cervical intraepithelial neoplasia. The diagnostic application of cold-knife conization was reduced following the widespread use of colposcopically directed cervical biopsies combined with endocervical curettage. However, conization remains an important diagnostic tool in selected situations.

Treatment of cervical preinvasive lesions is divided into ablative and excisional techniques. Ablative therapy destroys the abnormal cells and the surface of the transformation zone. Excisional therapy also provides a surgical specimen that is examined in the laboratory to evaluate the severity of the diseased tissue removed and if possible, the completeness of the procedure and evaluation of cone margins.

By definition conization of the cervix is an excision of a cone-shaped or cylindrical wedge from the cervix uteri that includes the transformation zone and all or a portion of the endocervical canal. It is used for the definitive diagnosis of squamous or glandular intraepithelial lesions, for excluding microinvasive carcinomas, and for conservative treatment of cervical preinvasive diseases or cervical intraepithelial neoplasia (CIN).

In situations, when large specimens are needed, or when evaluation of the histology is critical, or any thermal damage is not acceptable then the cold – knife conization may be performed. Such instances, for example, include situations of suspected microinvasive carcinoma or adenocarcinoma in situ of cervix or in situations in which the use of a diathermic loop is impossible because of the proximity of the exocervical margin to the vaginal fornix.

Before popularity of colposcopy, for a long time the cold- knife conization was used as a standard treatment of preinvasive cervical diseases and in situations when the uterine conservation was a desired outcome.

The usage of cold-knife conization has decreased considerably in frequency following the wide acceptance of LEEP and laser conization, which yields equivalent results, is more cost effective, and appears to cause less intraoperative and postoperative bleeding. Newer procedures can be

performed in outpatient, they have reduced morbidity relative to cold-knife conization and at present they replace cold-knife conization procedure in majority of cases.

In present-day many young doctors have limited the use of cold –knife conization in their practice at all and to situations, in which very large conizations are needed, or in which evaluation of the histology is critical and the risk of even a small possibility of thermal artifact at the cone margins cannot be tolerated. However, even with these indications in the hands of an experienced senior practitioner, electrosurgical loop conization or laser conization can create an acceptable specimen with respect to cone size and histologic quality.

Although some have suggested that cold-knife conization can be done with local anesthesia, the risk of intraoperative bleeding and the need for surgical assistance (retraction) mean that this procedure is almost always done in the operating room.

## Technique

The patient is placed in the dorsal lithotomy position. For exposing of the cervix; a speculum is inserted into the vagina. The transformation zone and the lesion are then delineated. The procedure can be done under direct colposcopic examination in situation when the colposcope is available. If the colposcope is not available, the cervix can be painted with Lugol's iodine for best marking of the limits of transformation zone and the limits of the cervical lesion.

Cold-knife conization can cause significant bleeding during the procedure. In an attempt to limit blood loss during cold-knife conization various methods have been used to achieve hemostasis.

The most popular of these involves laterally placed hemostatic sutures at the proximal portion of the cervix to ligate the descending cervical branches of the uterine artery. Another approach is to inject a vasopressor agent solution such as dilute vasopressin, phenylephrine, or epinephrine directly into the substance of the cervix. Many clinicians use both techniques for reducing blood loss. Majority of practitioners prefer to perform preconization cerclage in most cases because, in contrast to vasoconstrictor injections, this technique does not induce tachycardia or sudden blood pressure changes and tends to reduce delayed hemorrhage.

The procedure if it is planned to be performed under local anesthesia has to be done without using standard vaginal surgery retractors as they cause pain.



**Figure 1.** Cervix is fixed with teneclua from anterior and posterior lips, at around 6 and 12 o'clock directions.

At the beginning of the procedure, the posterior and anterior lips of the cervix is held with a delicate bullet forceps applied transversely (Figure 1, 2).

The resection is performed inside the speculum using two different knives: straight blade and one oblique blade. Two successive incisions are made. If it is not possible to use two different knives, the resection can be done by one straight knife (Figure 3).

A circumferential incision is then made at the periphery of the transformation zone as delineated by colposcopy or Lugol's staining. The incision need to be circular and can follow the border of the transformation zone and lesion (Figures 4, 5).

If the procedure is planned to be performed by two different knives for the first incision usually is used straight blade. Before the resection will be performed; a delicate bullet forceps is inserted into the edge of the cervix at approximately 12 o'clock. The cervix is pulled axially. The first incision must circumscribe the outer limit of the lesion. The incision must be circular or elliptical the radius being chosen to include the greatest diameter of the lesion. It is



**Figure 2.** Fixation sutures are used at both sides, at 3 and 9 o'clock directions.

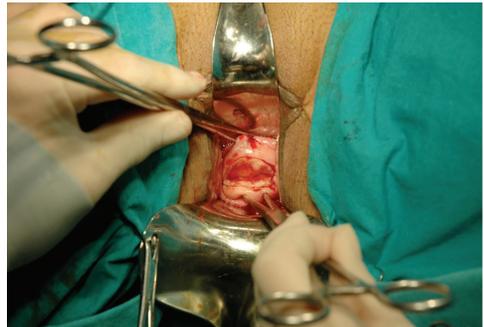


**Figure 3.** T-zone is excised from ectocervix, with cold knife in a circular fashion. Depth and width of this excision may change according to the lesion.

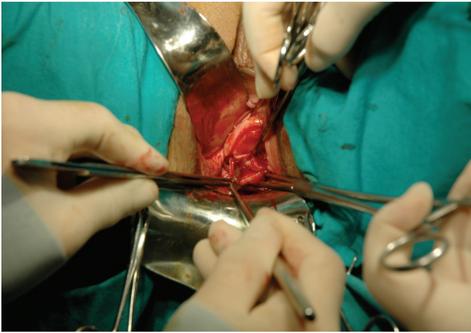
very important for histological negative cone margins to leave a margin of approximately 3 mm. One commences at the 4 o'clock position. The blade penetrates to a depth of 4 mm. It is important that the knife is handled axially as if to resect a cylinder rather than a cone (Figure 5, 6). Going clockwise one finishes at the point where one started.

At the situation when the procedure is done by different knives for the second incision the bullet forceps is moved. The bullet forceps is inserted into the connective tissue on the inside lip of the first incision at the 4 o'clock position. Traction on the forceps broadens the wound and permits an oblique approach. The angle of the plane of incision is calculated based on the endocervical extension of the lesion. The goal of the incision is to have a 3 mm margin above the top of the lesion. The incision is performed clockwise. Once the posterior lip has been detached, the bullet forceps is moved to the anterior lip and left there until the specimen has been completely detached.

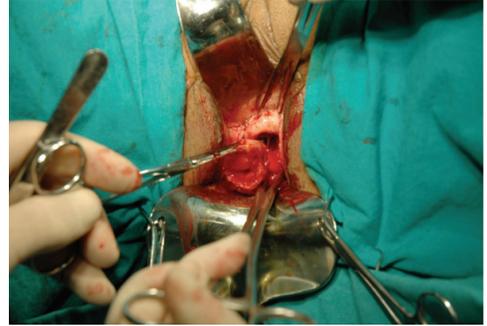
After removal of the specimen, a variety of techniques can be used to achieve hemostasis of the cone bed (Figure



**Figure 4.** Excision line is determined and cervical tissue is cut through this line.



**Figure 5.** A cylindrical shaped cervical tissue is excised.



**Figure 6.** Cylinder shaped excision is finalized.

7). The bleeding in the conization bed can be controlled by electrocautery, simple sutures, or even Monsel's paste, Sturmdorf sutures.

For the long time being in use traditional Sturmdorf suture is a vertical mattress suture that folds the remaining ectocervical epithelium into the conization bed and tamponades the bleeding vessels. Although the technique is effective at achieving hemostasis, this suture distorts the cervical anatomy and make it very difficult to adequately visualize the transformation zone of the cervix in the future examination.

There is a modification of the Sturmdorf technique. Unlike the standard Sturmdorf technique there is no need to invaginate the peripheral cervical flap into the cervical canal leaving a free space around the orifice. After suturing, cervical morphology is far from normal. The choice of suture is of great importance. Monocryl has the best absorption properties: neither too fast, which could increase the risk of secondary hemorrhage, nor too slow, which could increase the risk of persistent cervical deformity.

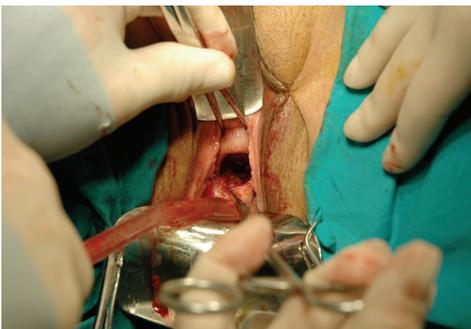
As a result, most authorities now advocate that bleeding in the conization bed can be better controlled by electrocautery,

simple sutures, or even Monsel's paste, rather than by Sturmdorf sutures.

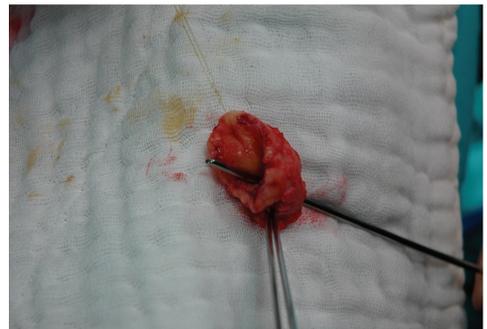
### Postoperative Course and Complications

Under the condition when the cold knife conization is performed on an outpatient basis, the patient can leave the hospital after 6h following the procedure. 2 or 3 weeks after this operation is necessary to observe a certain mode of heal. Patients should avoid occupational activities, heavy housework, active sports. Sexual intercourse is prohibited until after postoperative assessment on day 14 or so. Even after cold knife conisation the loss of substance does not alter the appearance of the portio.

As with any operation under the perioperative and postoperative complications may occur also in cold knife conization. As a rule such complications are rare. The most rare complications are injuries to the bladder and rectum, or severe bleeding in the perioperative period due to direct injury of collateral uterine arteries. All these complications are usually due to lack of skills of the surgeon. The most common postoperative complication is bleeding. This is due



**Figure 7.** Electrocautery of the cone bed.



**Figure 8.** Tissue specimen is labeled at 12 o'clock direction with a small suture.

to the volume of the sample removed, and for this reason, most often after a cold knife conisation electrocauterization or suturing is not required in more than 1-3% of cases. Most post-operative bleedings occur within the first 24 hours after surgery. The incidence of postoperative bleeding peaks again around the 10<sup>th</sup> day after the procedure and the risk disappears completely 14 days later. The early post-operative complications also include hematoma and infection, but they are rare.

Cervical stenosis and cervical incompetence are late complications after cold knife conization. Both effects are directly dependent on the volume of the sample, and, more specifically, on its depth. For this reason they are more often after a cold knife conisation compared to other conisation techniques. Quite rare are complications as dysmenorrhea, pelvic pain, abnormal bleeding as conditions related to possible endometritis. Fertility problems classically: infertility, miscarriage, premature birth.

### Results of the Cold-Knife Conization Procedure

Procedure itself is quite rare in everyday practice. It has been reduced as LEEP and laser-conization are more easy to use, but still it remains an important option in diagnostics and treatment of premalignant lesions or preinvasive cancer. When properly performed, it gives accurate representation of the disease process and has low risk complications. Procedure itself is curative in most cases. Cold knife conization is preferred in cases where margin status is critical, such as glandular lesions and suspected microinvasion.

Procedure could be done in day-surgery or needs the hospitalisation. Bleeding control needs usually diathermocoagulation or even sutures. At the same time the volume of the removed specimen is usually 50% larger compared to LEEP or laser-conization which gives the same outcome in disease control. At the same time this is a risk factor for pregnancy complications.

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