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Loop electrosurgical excision procedure: A Review



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ABSTRACT

LEEP is a one-of-a-kind outpatient procedure for diagnosing and treating dysplastic cervical lesions. Loop diathermy treatment, loop excision of the transformation zone (LETZ), and large loop excision of the transformation zone (LLETZ) are other names. This approach yields high-quality cytologic specimens and has no negative effects on reproductive function. It also can be used to treat cervical cancer by replacing cryotherapy or laser. LEEP can be used to bypass the entire transformation zone. This is done with the help of a high-frequency, low-current electric generator and a stainless-steel loop. The LEEP procedure has a similar complication rate to cryotherapy. Bleeding is the most common complication. In addition, there may be inadequate lesion removal and cervical stenosis. LEEP has several advantages over other treatments, including removing aberrant tissue that allows cytologic examination, cheap cost, simplicity of acquiring important skills, and the potential to treat lesions with fewer visits. Patients are pleased with the surgery. LEEP is anticipated to be widely used by family physicians.

Keywords: LEEP, LLETZ, cervical conization, cone biopsy.

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INTRODUCTION

Loop electrosurgical excision procedure is one of the procedures used in treating cervical intraepithelial neoplasia (CIN). This procedure was first presented in 1989, and this procedure is still used until now.¹ This procedure will be very often used, given the increase in the prevalence of CIN.⁵

Cervical conization (cone biopsy) has been used to treat high-grade cervical dysplasia for many years. Cervical conization is the surgical removal of a cone-shaped part of the cervix around the endocervical canal, including the whole transformation zone. Excisional therapy can be done in several ways. Scalpel ("cold-knife conization"), laser, and electrosurgery are among them.⁶

LEEP offers the benefit of allowing the pathologist to examine an intraepithelial or superficially invasive lesion in its entirety. However, this method does not give the entire lesion in some circumstances (pregnancy, expansion of the lesion into the vaginal fornices, or high in the endocervical canal). Furthermore, thermal cautery reduces blood loss during excision but can generate thermal artifacts hindering specimen interpretation.⁶

Conization of the cervix to treat CIN is associated with adverse pregnancy outcomes such as early delivery, low birth weight, incompetent cervix and cervical stenosis. Certain studies suggest cone depth may be related to poor pregnancy outcomes.²⁻⁴ A systematic review has reported the pregnancy outcome after undergoing the LEEP procedure. Most of them had higher preterm birth (12.6%; OR: 2.53; CI 95%: 1.42-4.49; P=0.001), birth weight less than 2500 grams (10.9%) (OR:1.60; CI 95%: 0.78-3.29; P=0.20), precipitous delivery (labor <2 hours) (9.4%) (OR:1.26; CI 95%: 0.53-3.00; P=0.60), and NICU admission (21.4%) (OR:2.27; CI 95%: 0.43-12.36; P=0.47) rather than the patient had no history of LEEP procedure.⁶ Thus, the study aimed to explain the LEEP procedure.

Indications and Contraindications of The LEEP Procedure

Patient selection based on indication and contraindication is required before undertaking this treatment. Unsatisfactory colposcopy may occur when the transformation zone is not fully visible, especially when the patient has a high-grade lesion, micro-invasion is suspected, lack of correlation between cytology and

colposcopy/biopsy, especially when a high-grade lesion is detected, a lesion extending into the endocervical canal, CIN or even the presence of adenocarcinoma in situ. After doing a colonoscopy, there is still a possibility of it happening invasive, recurring after ablative excision surgery or before.⁷

After knowing the indications for the procedure, it is necessary to pay attention to some contraindications. There are several contraindications to using the cone method, such as the cervix is not sufficient to be excised due to a history of previous excision, the patient is not a good candidate for surgery, and pregnancy being a relative contraindication to the cold knife cone, which should only be used if invasive cancer is suspected. The cone is not recommended for people who have severe cervicitis or are on anticoagulant medication.⁸

Preparations of LEEP Procedure

Several steps need to be prepared before the LEEP procedure. In this section, there are several preparation steep need to be done, such as the LEEP instrument, anesthesia drugs, and the team for the LEEP procedure.^{7,8}

Local anesthesia with a 25-gauge

to 27-gauge needle injects the solution 1 cm deep into the cervix outside the excised region. Following injection, the cervix should blanch. Several instruments used in the LEEP procedure were a high frequency (350-1200 kHz) or low voltage electrosurgical generator (200-500 V), pad for grounding, smoke evacuating the system, speculum vaginal insulated with smoke evacuation tube, LEEP or Fischer cone biopsy excisor electrodes of various sizes, ball electrode 3-5 mm, tenaculum with one tooth, Monsel's cure, a 3-5 percent acetic acid solution, Pitressin plus 1% lidocaine solution (10 units in 30 mL of 1% lidocaine) or 1% lidocaine with epinephrine (1:100,000 dilution), a 25-27 gauge needle, and a 10-mL syringe.^{7,8}

Complications and Prevention of LEEP Procedure

Vaginal hemorrhage, premature birth, and cervical stenosis are all common consequences of LEEP.⁹ Postoperative peritonitis, vesicovaginal fistula, vaginal evisceration, and lower urinary tract damage are uncommon consequences of LEEP.¹⁰⁻¹²

Early complications that can occur are bleeding. Vaginal bleeding may occur during or up to two weeks after the surgery. The possibility of postoperative bleeding occurs around 5% -15%. If bleeding occurs during surgery, it can be stopped with various suturing techniques and hysterectomy as a last resort. However, if bleeding occurs after surgery, the first thing that can be done is to conserve or monitor the patient by providing medical assistance such as Monsel paste, silver nitrate, or packing, which often treats most of these patients.¹³

Cold knife cone infection is rare and can be cured with medication. Long-term complications that can occur after this procedure are cervical stenosis and insufficiency. The stenosis can be treated by dilatation, and if a deep cone-base specimen or aggressive Bovie cauterization of the endocervical canal is obtained, it should be evaluated postoperatively. According to conflicting evidence, the excision procedure is associated with an increased risk of preterm birth and neonatal death. No randomized controlled studies exist. Most studies show that cold

knife cones are associated with a higher risk of preterm birth and perinatal death, whereas LEEP is not. Deeper excision appears to increase the risk of PPRM and preterm birth.¹⁴ An increase in operations has been associated with an increased risk of premature delivery.^{15,16}

Meanwhile, a rare case happens after undergoing the LEEP procedure. A 27-year-old lady was recommended for HSIL treatment. LEEP was conducted without incident under propofol-assisted sedation. Following this operation, the patient's health deteriorated. A hemoperitoneum was discovered during the transvaginal examination.¹⁷

Three electrosurgery principles should be considered when performing the LEEP treatment to reduce complications and increase specimen quality. Examples include electrode size, current waveform, and incision speed. Thinner electrode wires allow for higher current concentration. The higher the power density, the stronger the cutting impact and the lower the heat dissipation. Because the stream is mixed, the coagulation depth rises in this procedure. A mixed current combines both cutting and coagulating currents. Higher mixing ratios result in increased coagulating current and, as a result, increased heat damage. The pace of the incision must be chosen. The neater the incision and the less thermal artifact in the samples, the faster the wire is pushed into the cervical tissue. The higher the thermal damage to the neighboring tissue, the faster the wire passes. This induces greater coagulation of the cone bed but may also cause more tissue necrosis and scarring. To limit cervical stenosis's chance, removing as little tissue as feasible is critical. Cervical stenosis is more likely with incision depths of one centimeter.¹⁸

Loop Electrosurgical Excision (LEEP) Technique

The LEEP excisional cone aims to eliminate the whole transformation zone. The size and form of the excision should be adapted to the specific circumstances. This is critical to avoid either incomplete lesion excision or excising an unusually big specimen, which can result in both short- and long-term problems.^{7,8}

Suppose the transformation zone and

lesion are in the endocervical canal, and the ectocervix seems normal. In that case, a less invasive excision may be performed to reduce the risk of long-term problems. If the lesion and transformation zone is restricted to the ectocervix and the endocervical canal seems normal, the excision can be broad and shallow, with just a small amount of endocervical canal resection required.⁸

Procedure

The patient is positioned in dorsal lithotomy with an isolated speculum to obtain a clear visualization of the cervix. Also, prepare a smoke evacuation tube in the vagina. An anesthetic/vasoconstrictor solution is injected into the cervix. Apply acetic acid (3-5%) or Lugol's solution on the cervix to help select the right electrode. Ideally, the lesion should be removed in one go. At the same time, loops must be carefully crossed around and under the transition zone. Dig to a depth of 5-8 mm across the transformation zone. For best results, the loop should slide through the cervix. The cutting current can then split the network. Also, pay attention to the speed of movement of the loop. Loops that move too slowly can cause damage from excessive heat exposure. However, if the loop movement is too fast, the surrounding tissue can be picked up so that the specimens taken are shallow. The condition could be better in patients with large lesions.^{7,8}

Following treatment, a colposcopic examination may be conducted to determine whether the excision was enough. After excision, an endocervical curettage may be done, although it is usually unnecessary because the outcome has little influence on future therapy. A Ball electrode is commonly used to control bleeding. The authors also advocate for applying Monsel's technique to the cone bed.⁸

Post-Procedure LEEP Procedure

Long-term monitoring is necessary for patients with cervical dysplasia. This is necessary because, after the first 1 to 5 years after diagnosis, there is a possibility that CIN will recur or be persistent. ASCCP (American Society for Colposcopy and Cervical Pathology) standards are

routinely used for follow-up care. Bogani et al. investigated relapse rates after LEEP and laser conization in individuals with high-grade cervical dysplasia (HSIL/CIN2+) in a 5-year follow-up study. Persistence of human papillomavirus infection is the only predictor associated with a higher chance of recurrence after LEEP or laser conization.¹⁹

In addition to analyzing the patient's health, educating the patient about the LEEP's post-procedure is necessary. Patients are advised to avoid intercourse and introduce nothing into the vagina for 2-4 weeks. In addition, the patient should avoid showering and swimming at the same time. After 6 weeks, she will be inspected to determine that her endocervical patency and proper healing have been established. Cervical cytology is evaluated, as previously stated.²⁰

CONCLUSION

LEEP is a simple office treatment performed under local anesthetic. Tissue for pathologic evaluation is obtained by excisional biopsy. The transition zone as a whole can be removed in a single piece. Long-term issues can be avoided by using as little tissue as possible.

DISCLOSURE

Author Contribution

All of the authors have contributed to this manuscript preparation.

Conflict of Interest

None.

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