

## Loop Diathermy and Cold-Knife Conization in Patients with Cervical Intraepithelial Neoplasia : A Comparative Study

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*One hundred and sixty-eight cases of cervical conization were performed for cervical intraepithelial neoplasia (CIN) in a 32-month study. The indications for conization were unsatisfactory colposcopic finding, abnormal epithelium that extended into the endocervical canal, a microinvasive cervical cancer, and significant discrepancy among cytology, colposcopy, and/or punch biopsy histology. In the early period of the study, conization was done by the cold-knife method (N=107), whereas loop diathermy was used in the latter part of the study (N=61). Both groups were similar in terms of age, indications for conization, and size of cervical cone specimens. Loop diathermy conization was done in a significantly shorter time ( $5.7 \pm 1.8$  minute vs  $15.2 \pm 6.1$  minute) ( $P < 0.05$ ) than cold-knife conization. However, the difference in the postoperative complications between loop diathermy (3.0%) and cold-knife conization (4.7%) was not significant. The incidence rate of residual CIN III lesions in the subsequent hysterectomy specimens, found by histological documentation on these specimens was 25.0 and 26.1 percent after loop diathermy and cold-knife conization respectively. These results suggest that loop diathermy is much easier to perform and a more time-conserving treatment modality than cold-knife conization in the management of patients with cervical intraepithelial neoplasia.*

Key Words : Loop diathermy conization, Cold-knife conization, Cervical intraepithelial neoplasia

### INTRODUCTION

The incidence of cervical intraepithelial neoplasia is increasing particularly in young women requiring conservative methods of treatment. Colposcopy and directed punch biopsies provide a histologic diagno-

sis of cervical intraepithelial neoplasia with the same accuracy as a cervical cone biopsy in satisfactory cases and consequently assist conservative management.

However, cervical conization remains mandatory in about 10~20% of cases whose colposcopy is unsatisfactory (Singer and Walker, 1982). Such cases have previously been managed with cold-knife conization which may be associated with well-documented complications, including hemorrhage, sepsis, stenosis, and cervical incompetence (Berkus et al., 1980; Larsson et al., 1983).

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Recently, a loop diathermy technique that uses a thin wire loop electrode and high frequency current to resect cervical lesions has been used safely and effectively for the management of patients with cervical intraepithelial neoplasia (Prendiville *et al.*, 1989; Howe and Vincenti, 1990; Chappatte *et al.*, 1991).

There have been few clinical trials comparing the loop diathermy conization to the traditional cold-knife technique (Oyesaya *et al.*, 1993). The aim of this study is to compare loop diathermy conization with cold-knife conization in terms of the time required to complete excision and maintain hemostasis, size of cone specimens, postoperative complications, and the incidence of residual lesion from subsequent hysterectomy specimen.

## MATERIALS AND METHODS

From January 1992 to September 1994, 168 patients underwent cone biopsy in the Department of Obstetrics and Gynecology at Yonsei University College of Medicine (YUMC) in Seoul. These patients were seen initially in the colposcopy clinic because of abnormal cervical smears suggesting CIN II, CIN III or two consecutive Pap smears suggesting CIN I. Cervical conization was performed in cases whose squamocolumnar junction was not fully visible. The other indications for conization were abnormal epithelium that extended into the endocervical canal, a microinvasive carcinoma of the cervix, and significant discrepancy among cytology, colposcopy, and/or punch biopsy histology (Lopes *et al.*, 1989). Women with invasive carcinoma of the cervix in portio biopsy specimens or endocervical curettage were excluded

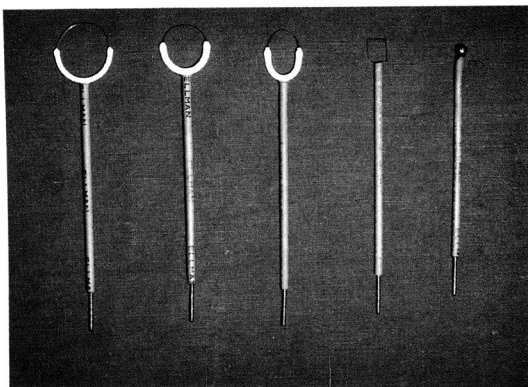


Fig. 1. Diathermy loops and cautery balls used in this study.

from the study.

In the early part of the study, cold-knife conization was most often used, whereas loop diathermy conization later became a standard method. Thus, the change from one technique to the other was gradual, depending partly on the gynecologist who performed the conization.

All cold-knife conizations were performed under general anesthesia. An angled cold knife was used to cut a cone. The cervical crater was left open but a vasopressin injection was not used to avoid the occurrence of inadvertent hypertension. The diathermy loop consisted of an insulated shaft attached to an insulated U-shaped arm, to which the loop wire was attached (Fig. 1). The loop used most frequently had a width of 20mm and a depth of 7mm, which shape was slightly elliptical. The shaft was also insulated and connected to the diathermy machine. The diathermy power was supplied using an Ellman surgitron radiosurgical unit (Ellman, New York, U.S.A.). Cutting, coagulation or a blend of both modalities could be used.

The loop diathermy procedure was performed under local or general anesthesia. Routine colposcopy using acetic acid was performed at the beginning of the procedure to outline the cervical lesion. Using a 27-gauge needle, prilocaine hydrochloride 3% solution was infiltrated into the cervix at four cardinal points (at 3, 6, 9, and 12 o'clock). After infiltration, a loop of appropriate length and width was chosen. The diathermy machine was adjusted to blend 35 Watts cutting with 35 Watts coagulation. The loop was pushed into the cervical tissue perpendicular to the surface as deeply as needed and withdrawn perpendicular to the surface (Prendiville *et al.*, 1989). The procedure usually took less than 15 seconds. After removal of the cone, ball diathermy was used to coagulate the surface of the wound to control any active bleeding. Ferric subsulfate (Monse's solution) was used following ball diathermy.

All tissues obtained at cone biopsy were submitted for histopathologic examination, and the histopathologic reports of patients who had undergone a subsequent hysterectomy were also reviewed.

The statistical analysis was carried out by Student's *t* test and  $X^2$  test with Yate's correction.

## RESULTS

One hundred and sixty-eight women had cervical

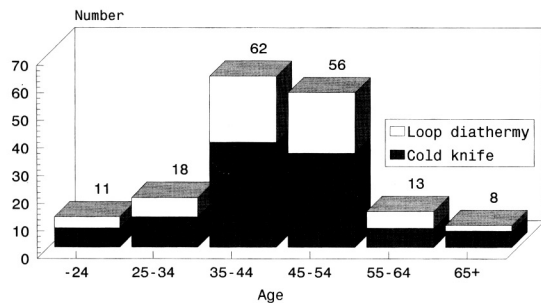


Fig. 2. Age distribution of patients with cervical intraepithelial neoplasia.

conization performed during this 32-month period, 107 by the cold-knife method and 61 by the loop diathermy method.

Fig. 2 shows the age distribution of this study population. The late 3rd and early 4th decade take the peak of the age distribution. Similar age distribution patterns are found between the loop diathermy conization group and the cold-knife conization group.

Table 1 lists the indications for the loop diathermy procedure in the study population. The main indication was invisibility of the squamocolumnar junction, similar to that in 107 patients who underwent cold-knife biopsy. Most of the patients (51) underwent the loop diathermy biopsy under general anesthesia. The patients having local anesthesia reported no pain, and there was no need for supplemental parenteral analgesia or general anesthesia.

Table 2 shows the width and depth of the cones and the operation time for the loop diathermy group and the cold-knife group. Loop diathermy conization was significantly quicker (mean time  $5.7 \pm 1.8$  min vs  $15.2 \pm 6.1$  min) ( $P < 0.05$ ) than cold-knife conization. However, the depth of cone biopsy measured post-

Table 2. Comparison of the results with loop diathermy and cold-knife conization.

	Loop diathermy	Cold-knife	P value
Width(cm)	$2.0 \pm 0.1$	$2.1 \pm 0.4$	NS
Depth(cm)	$1.2 \pm 0.3$	$1.2 \pm 0.4$	NS
Op. time(min)	$5.7 \pm 1.8$	$15.2 \pm 6.1$	$< 0.05$
Complication	2/61(3.0%)	5/107(4.7%)	NS

NS ; not significant

fixation was similar ( $1.2 \pm 0.3$  cm vs  $1.2 \pm 0.4$ cm) ( $P > 0.05$ , NS) in both groups. There were 2 cases(3.0%) of complications recorded in the loop conization group ; two (3.0%) postoperative hemorrhages treated for an outpatient with vaginal packing and antibiotics. There were 5 cases (4.7%) of complications including intraoperative and postoperative bleeding in the knife conization group. The proportion of women with at least one complication was not significantly different between the loop diathermy conization group (3.0%) and the cold-knife conization group(4.7%) ( $P > 0.05$ , NS).

Subsequent hysterectomies performed in the loop diathermy groups and cold-knife conization groups were 50.8 and 59.8 percent respectively. Hysterectomy in this study was indicated if there were associated gynecologic diseases such as uterine myoma, dysfunctional uterine bleeding(DUB) and endometriosis. The other indications for subsequent hysterectomy were CIN II or III at the margin of the cone biopsy and the patients with CIN who wanted permanent sterilization. Table 3 shows the comparison of histopathologic diagnosis between loop diathermy conization and subsequent hysterectomy.

From 46 hysterectomy specimens of the cold-knife conization group with CIN III, twenty-six showed no residual disease(Table 4). The incidence rate of residual CIN III lesions in the subsequent hysterectomy

Table 1. Indications for cervical conization.

Indications	Loop diathermy No. of pts(%)	Cold-knife No. of pts(%)
Squamocolumnar junction not visible	22(36.1)	36(33.9)
Upper limit of the lesion in the cervical canal	19(30.6)	34(31.2)
Discrepancy between colposcopy and cytology	16(26.8)	29(27.4)
Microinvasion of cervical cancer	4( 6.5)	8( 7.5)
Total	61(100.0)	107(100.0)

**Table 3.** Relation between loop diathermy conization and residual disease in hysterectomy specimens.

conization hysterectomy	No dysplasia	CIN I	CIN II	CIN III	MC	Total
No dysplasia	1			14		15
CIN I		1		2		3
CIN II	1		1	2	1	5
CIN III				6	2	8
MC						
Total	2	1	1	24	3	31

CIN ; cervical intraepithelial neoplasia, MC ; microinvasive carcinoma of the cervix.

**Table 4.** Relation between cold-knife conization and residual disease in hysterectomy specimens.

conization hysterectomy	No dysplasia	CIN I	CIN II	CIN III	MC	Total
No dysplasia	2	3	3	26		34
CIN I	1	3	2	4		10
CIN II			1	3	1	5
CIN III				12	2	14
MC				1		1
Total	3	6	6	46	3	64

CIN ; cervical intraepithelial neoplasia, MC ; microinvasive carcinoma of the cervix.

specimens, found by histological documentation on these specimens was 25.0 and 26.1 percent after loop diathermy conization and cold-knife conization, respectively ( $P > 0.05$ , NS).

## DISCUSSION

Loop excision of cervical lesions has been in practice in France for several decades. Colposcopy and directed biopsies, as well as the introduction of successful destructive methods of treatment for cervical dysplasia such as cryosurgery (Creasman *et al.*, 1984 ; Bryson *et al.*, 1985), electrocautery (Woodman *et al.*, 1985 ; Deigan *et al.*, 1986), laser ablation (Ali *et al.*, 1986 ; Baggish *et al.*, 1989), and cold coagulation (Stland, 1978 ; Duncun, 1983), heralded the temporary demise of the innovation until Cartier reintroduced the technique in 1984.

Cartier(1984) used small loops, 5X5mm in size, to replace punch biopsy and achieved a better sample of the affected area of the cervix. To reduce thermal damage during the procedure, several changes to the procedure were made (Prendiville *et al.*, 1989). The electrosurgical unit was adjusted to allow the use of a blend of cutting and coagulation diathermy power, and the base of the loop was insulated to minimize the risk of diathermy artifactual damage to

the surface epithelium removed. Loop diathermy proved superior to conventional punch biopsy forceps for taking a colposcopically directed biopsy (Chappatte *et al.*, 1991 ; Howe and Vincenti, 1991). The technique has been used more recently with larger loops for excision of the entire transformation zone as an alternative to local destructive methods and had the added advantage of allowing histological examination of the whole transformation zone (Prendiville *et al.*, 1989).

Cold-knife conization was a minor surgical procedure but it was often associated with postoperative complications such as postoperative hemorrhage, infection and cervical stenosis (Sprang *et al.*, 1977 ; Berkus *et al.*, 1980). Postoperative hemorrhage, the most common complication, generally has been reported to be 5 to 20% (Jones *et al.*, 1980 ; Larsson *et al.*, 1983). The complication rate after cold-knife conization in this study was almost within these limits. However, these proportions of complication were lower following loop diathermy conization.

In a recent study of endoscopic localization of the squamocolumnar junction(SCJ) in patients with unsatisfactory colposcopy, it was found that the mean depth of the new SCJ was 11.3mm from the external os(Saunders *et al.*, 1990). Based on this result, we decided to cut our cones to a mean depth of 1.2cm

according to the cervical geometry, which was adequate in most cases. Cold-knife cones can be usually deeper than loop diathermy cones. We decided to cut our loop biopsies in one piece as previously described (Mor-Yosef et al., 1990) using a single pass technique because we found it easier to assess the endocervical resection margins for clarity and to rule out invasion. If, inadvertently, a cone biopsy was cut in more than one piece then we marked the endocervical resection margin to enable easier pathological assessment.

When further surgery is performed for CIN diagnosed at cone biopsy, residual lesion of CIN has been associated with cone resection margin involvement and diversely reported in 8.6–54.8% of cases (Burghardt and Holzer, 1980; Ostergard, 1980; Benedet et al., 1982; Abdul-Karim et al., 1985; Buxton et al., 1987; Husseinzadeh et al., 1989). This variation in the reported incidence of residual CIN may result from the interval between conization and hysterectomy, the excision status at conization, and the indication for hysterectomy (Buxton et al., 1987). Inflammatory changes after cone biopsy can mimic undifferentiated residual CIN (Bajardi, 1961). Especially when subsequent hysterectomy is performed soon after cone biopsy, pathology specimens can be difficult to interpret. This may cause a high number of false-positive cases of residual disease in hysterectomy specimens (Jansen et al., 1994). Among 168 patients with conization in the present study, 95 underwent subsequent hysterectomy within 6 weeks; 46 (48.4%) of the hysterectomy specimens contained residual disease. However, there was no significant difference in the presence of residual lesion of the hysterectomy specimens between the loop diathermy conization and the cold-knife conization group.

Operating time required to complete excision and maintain hemostasis for loop diathermy conization has been reported to range from less than 1 minute up to 7.4 minutes (Gunasekera et al., 1990; Keijser et al., 1992; Alvarez et al., 1994). Oyesaya et al. (1993) reported loop diathermy conization was a less time-consuming procedure compared to cold-knife conization.

In conclusion, loop diathermy conization is much easier to perform and a more time-conserving treatment modality than cold-knife conization for patients with cervical intraepithelial neoplasia.

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