RESEARCH COMMUNICATION

Perioperative Complications of an Outpatient Loop Electrosurgical Excision Procedure: A Review of 857 Consecutive Cases

Ponlawat Sutthichon, Chumnan Kietpeerakool*

Abstract

This study was conducted to evaluate the incidence and predictor of perioperative complications of the loop electrosurgical excision procedure (LEEP) in an outpatient setting at Chiang Mai University Hospital between October 2004 and December 2008. During this time period, 857 women were reviewed. Mean age was 45.1 years (range, 20-78 years). One-fourth of the women were postmenopausal. Eighty-one (9.5%) women were HIV positive. Perioperative complications were as follows: intraoperative bleeding, 29 (3.4%); early postoperative bleeding, 5 (0.6%); late postoperative bleeding, 42 (4.9%); and infection 37 (4.3%). The size of LEEP specimens was noted to be a significant predictor. Women who had a large LEEP specimen excised (defined as 20 mm or more) were 2.09 (95% Confidence Interval, 1.39-3.14) times more likely to have perioperative complications. In conclusion, outpatient LEEP is safe and has an acceptable perioperative complication rate, although large size carries greater risk.

Key Words: Cervical preneoplasia - LEEP - perioperative complications - risk factors - Thailand

Asian Pacific J Cancer Prev, **10**, 351-354

Introduction

To prevent cervical cancer, adequate screening and appropriate management of cervical intraepithelial neoplasia (CIN) is of paramount importance. Although there are various strategies for treating women with CIN (Prendiville 1995; Kietpeerakool and Srisomboon 2009), loop electrosurgical excision procedure (LEEP) is the common procedure. LEEP has become one of the key interventions for cervical cancer prevention, particularly in low-resource, high volume settings (Pfaendler et al., 2008).

Compared to the other treatments, LEEP has several advantages, including that of requiring only local anesthesia so it can be performed in outpatient departments. The procedure is easy to learn and also provides tissue for definite histopathology diagnosis, with resulting in reduction of the possibility of occult cancer going unnoticed (Prendiville 1995).

Generally, outpatient LEEP is considered to have low surgical morbidity. In a previous study, the authors reported that outpatient LEEP was feasible and safe for managing women with CIN (Kietpeerakool et al., 2006). However, due to the considerably small size of the previous study, this larger series was undertaken to review the incidence and predictors of perioperative complications of outpatient LEEP.

Materials and Methods

In the authors' institute, the data about women undergoing LEEP, including patients' characteristics, types of abnormal smears, colposcopic findings, histopathologic results, and symptoms and complications during or after procedure have been routinely collected and recorded in the LEEP database since October 2004. After approval from the Research Ethics Committee, all women who had undergone their first LEEP between October 2004 and December 2008 were reviewed. The outcomes of women who had undergone repeat LEEPs were excluded from this review. HIV testing was routinely screened before colposcopy.

LEEP was performed in an outpatient setting using local anesthesia. The electrical power for the loop electrode was set in blended mode. The aim was to remove the entire lesion in a single pass. If the first pass failed to remove the entire lesion, a second pass or third pass was carried out. All specimens were oriented and were pinned in clock position in order to prevent specimen disorientation.

The edge of the crater and then the bed of the crater were coagulated using a 5 mm ball electrode with a pure coagulation frequency, and with protection of the endocervical os. An application of Monsel's paste over the cervical crater was made solely upon a particular

*Department of Obstetrics and Gynecology, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand *For correspondence: kiet_ji@hotmail.com*

surgeon's preference.

Prophylactic antibiotics were not routinely prescribed. Patients were advised to avoid sexual intercourse and vaginal douching for 4 weeks. A first follow-up was scheduled 2 weeks after LEEP to counsel about histopathologic results and treatment decision-making, and to inquire about symptoms and complications.

Uncomplicated vaginal bleeding was defined as postoperative vaginal bleeding of less than 14 days which did not require any treatment, excluding menstrual bleeding. Persistent vaginal bleeding was defined as prolonged postoperative vaginal bleeding of at least 14 days, excluding menstrual bleeding, which did not require any treatment. Uncomplicated or persistent vaginal bleeding was evaluated after excluding women who had any perioperative complications.

Experience in controlling bleeding during LEEP was defined as difficult when adequate hemostasis using ball cauterization took more than 30 minutes to achieve but did not require cervical suturing or vaginal packing.

Intraoperative bleeding was considered as a complication if cervical suturing or vaginal packing were necessary. Early (within 24 hours) and delayed (after 24 hours) postoperative bleedings were considered severe if hemostatic interventions, including application of Monsel's paste, cervical suturing, or vaginal packing were required.

Postoperative infection was defined as purulent vaginal discharge, cervicitis, endometritis, and pelvic inflammatory disease.

The statistical analysis was carried out using SPSS computer software (SPSS Inc, Chicago). The chi-square or Fisher exact test was used to univariately analyze factors related to perioperative complications. For those factors with a P-value of less than 0.20 in univariate analysis, multivariate analysis using a logistic regression model was used to identify the independent predictors. An odds ratio with a 95% confidence interval (CI) that did not include unity was considered statistically significant.

Results

In this study, 857 women were reviewed. Their mean age was 45.1 years (median, 45 years; range, 20-78 years). Approximately one-fourth (25.8%) of the women were postmenopausal. Fifty (5.8%) were nulliparous. Table 1 displays cytopathologic findings for the 857 women.

LEEP margin involvement was noted in 397 women (46.3%) including endocervical margin involvement (18.8%), ectocervical margin involvement (13.8%), and both endocervical and ectocervical margin involvement (13.8%).

Eighty-one (9.5%) women were HIV positive. Eight women were newly diagnosed from the universal HIV screening prior to the procedure. The median time of infection was 4 years (range, 1-20 years) for the 73 women previously known to have HIV infection. CD4 cell results within the 6 months prior to the procedure were available for 76 women. The mean number was 318.4 (median, 291 cells/μL; range, 14-900 cells/μL).

The details of perioperative symptoms and complications are displayed in Table 2. Ten (1.2%) women were admitted as inpatient owing to bleeding (9) and

Table 1. Characteristics of the 857 Patients

Characteristics		Number (%)
Pap smear type	HSIL	491 (57.3)
	Cancer	99 (11.6)
	ASC-H	97 (11.3)
	Others	170 (19.8)
LEEP Indications	HSIL on smear/CDB	650 (75.8)
	Unsatisfactory colposcopy	167 (19.5)
	Others	40 (4.6)
Margin involved	Negative	421 (49.1)
	Positive	397 (46.3)
	Non-evaluable	39 (4.6)
LEEP histopathology		
	CIN I	42 (4.9)
	CIN II-III	549 (64.1)
	Cancer	150 (17.5)
	Others	116 (13.5)

HSIL, high-grade squamous intraepithelial lesion; ASC-H, atypical squamous cell cannot exclude HSIL; LEEP, loop electrosurgical excision procedure; CDB, colposcopically directed biopsy; CIN, cervical intraepithelial neoplasia

Table 2. Perioperative Symptoms and Complications

Variable	Category	Number (%)
Symptoms† (N=744)		
	Persistent vaginal bleeding	35 (4.7)
Complications (N=857)		
	Intraoperative bleeding	29 (3.4)
	Early postoperative bleeding	5 (0.6)
	Late postoperative bleeding	42 (4.9)
	Infections	37 (4.3)

†Excluding menstrual bleeding and women who experienced any perioperative complications

Table 3. Univariate and Multivariate Analyses for Prediction of LEEP Complications

Variables/ Category	Number (%)	P-value	Multivariate OR (95%CI)	P-value
LEEP size†				
≥ 20	47/240 (19.6)	0.001	2.09 (1.39-3.14)	<0.001
<20	66/617 (10.6)			
HIV infection				
Positive	6/81 (7.4)	0.11	0.46 (0.19-1.10)	0.08
Negative	107/776 (13.8)			
Age (years)				
≥ 45	62/410 (15.1)	0.13	1.40 (.092-2.10)	0.12
<45	51/447 (11.4)			
Pathology				
Cancer	21/150 (14.0)	0.80	Variable removed	
Lesser	92/707 (13.0)			
LEEP ps‡				
Single	35/260 (13.5)	0.91	Variable removed	
Multiple	78/597 (13.1)			
Parity				
Nulliparous	8/50 (16.0)	0.52	Variable removed	
Mutiparous	105/807 (13.0)			
Monsel used				
Yes	50/336 (14.9)	0.26	Variable removed	
No	63/521 (12.1)			

†Greatest dimension on cone piece (mm); ‡Number of LEEP specimens (piece)

cervical wound infection (1). Uncomplicated vaginal bleeding persisted for an average of 3.5±3.3 days. These women were successfully treated in the outpatient department. Difficulty in stopping bleeding was noted in 11 (1.3%) women.

Univariate analyses were performed which included age, LEEP size, HIV status, application of Monsel's solution, number of LEEP passes, and histopathology. LEEP size, age, and HIV status were found to have a P-value of less than 0.20. Multivariate analysis using a logistic regression model, which included these three covariates, was then performed. Only LEEP size remained as a statistically significant predictor for having perioperative complications (Table 3).

Discussion

To audit the quality of clinical practice, the UK National Health Service Cervical Screening Programme (NHSCSP) has published guidelines that cover a variety of issues relating to cervical cancer prevention including the safety of treatment of CIN. In the NHSCSP 2004 guidelines (Luesley and Leeson 2004), the safety of CIN treatment was determined by two criteria. Firstly, the proportion of treatment associated with primary hemorrhage requiring a hemostatic technique in addition to the treatment method must be less than 5%. Secondly, the proportion of patients admitted as inpatients owing to treatment complications must be less than 2%.

In this study, although the prevalence of postoperative bleeding was higher than recommended in the NHSCSP 2004 guidelines, only 1.2% of women needed inpatient treatment for this complication. Bleeding complications in the remaining women were mild and were successfully treated in the outpatient department. The safety of the outpatient LEEP in this study was therefore acceptable with respect to the low rate of severe bleeding complications. However, these guidelines give neither a definition nor a standard acceptable rate of post-LEEP infection.

Although perioperative complications following LEEP for either bleeding or infection in this study were comparable to those previously reported (Chan et al., 1997; Dunn et al., 2004; Paraskevaidis et al., 2002; Pfaendler et al., 2008; Prendiville 1995), direct comparison across various studies might be somewhat unreliable because of different or unspecified definitions used for each complication.

In this study, the authors systematically evaluated the predictors for a higher risk of LEEP perioperative complication and found that the size of LEEP specimens was a significant predictor. Women with large LEEP specimens (greatest dimension of 20 mm or more) are approximately 2 times more likely to have perioperative complications. So, limited cervical tissue excision as necessary should be attempted to minimize possible LEEP complications.

Because of their immunocompromised status, higher LEEP complications among HIV-infected women might be theoretically possible. This concern needs to be evaluated because LEEP is one of the key interventions for cervical cancer prevention, particularly in developing countries, which are areas of high incidences of HIV infection and human papillomavirus-related cervical diseases. So, information regarding the safety of LEEP among HIV infected women is relevant. In the author's previous studies, HIV infection alone did not have a significant impact on LEEP complications (Kietpeerakool et al., 2006; Kietpeerakool et al., 2008). This favorable finding was also observed in this study.

Cancer is well known for an association with higher neovascularization and inflammation. Therefore, there is a possibility of a higher LEEP complication rate in women with such lesions. However, the authors previously reported that using LEEP used in women with occult invasive lesions is safe and has an acceptable incidence of perioperative complications (Kietpeerakool and Srisomboon 2006). Again, the safety of LEEP in women with occult invasive lesion was confirmed by this larger study.

Monsel's paste is now widely used among gynecologist to strengthen hemostasis after tissue biopsy or excision. However, the significant benefit of an application of Monsel's paste after LEEP to prevent postoperative complications was not observed in either this study or in our previous randomized study (Kietpeerakool et al., 2007).

A high rate of failure to follow-up after LEEP has been previously observed (Siriaree et al., 2006). Additionally, most of them were complete child bearing. The authors therefore did not attempt to determine long-term complications. Based on available data, LEEP appears to be associated with adverse pregnancy outcomes including premature rupture of membrane, preterm delivery and low birth weight (Crane 2003; Samson et al., 2005). Therefore, counseling about these risks during informed consent for LEEP should be given in women of reproductive age.

The high rate of LEEP margin involvement in this study was expected. This finding might be possibly explained by the following two reasons. Firstly, because of the high incidence of invasive lesions in LEEP specimens in this study (17.5%), the authors previously reported that women with invasive lesions in their LEEP specimens were almost 10 times more likely to have margin involvement (Kietpeerakool et al., 2005). Secondly, there was a high incidence of HIV-infected women in this study (9.5%). HIV-infected women have a higher risk of LEEP margin involvement, particularly in HIV-infected women whose CD4 cell count is less than 200 cells/μL (Kietpeerakool et al., 2009).

In conclusion, outpatient LEEP is safe and has an acceptable perioperative complication rate. In this study, only LEEP size was noted to be a significant predictor of perioperative complications.

References

Chan KS, Kwok CW, Yu KM, et al (1997). A three-year review of treatment of cervical intraepithelial neoplasia with large loop excision of the transformation zone. *Hong Kong Med J*, **3**, 21-6.

Crane JM (2003). Pregnancy outcome after loop electrosurgical excision procedure: a systematic review. *Obstet Gynecol*, **102**, 1058-62.

Dunn TS, Killoran K, Wolf D (2004). Complications of outpatient LLETZ procedures. *J Reprod Med*, **49**, 76-8.

Kietpeerakool C, Srisomboon J, Ratchusiri K (2005). Clinicopathologic predictors of incomplete excision after loop electrosurgical excision for cervical preneoplasia. *Asian Pac J Cancer Prev*, **6**, 481-4.

Kietpeerakool C, Srisomboon J (2006). Safety of the loop electrosurgical excision procedure in women with early invasive cervical carcinoma. *Int J Gynaecol Obstet*, **95**, 54-5.

Kietpeerakool C, Srisomboon J, Khobjai A, et al (2006). Complications of loop electrosurgical excision procedure for cervical neoplasia: a prospective study. *J Med Assoc Thai*, **89**, 583-7.

Kietpeerakool C, Srisomboon J, Suprasert P, et al (2006). Outcomes of loop electrosurgical excision procedure for cervical neoplasia in human immunodeficiency virus-infected women. *Int J Gynecol Cancer*, **16**, 1082-8.

Kietpeerakool C, Srisomboon J, Suprasert P, et al (2007). Routine prophylactic application of Monsel's solution after loop electrosurgical excision procedure of the cervix: is it necessary? *J Obstet Gynaecol Res*, **33**, 299-304.

Kietpeerakool C, Suprasert P, Srisomboon J (2009). Outcome of loop electrosurgical excision for HIV-positive women in a low-resource outpatient setting. *Int J Gynaecol Obstet*, **105**, 10-3.

Kietpeerakool C, Srisomboon J (2009). Medical treatment of cervical intraepithelial neoplasia II, III: an update review. *Int J Clin Oncol*, **14**, 37-42.

Luesley D, Leeson S (2004). Colposcopy and Programme Management. Guideline for the NHS Cervical Screening Programme. NHSCSP Publication No.20. Sheffield, UK: NHSCSP.

Paraskevaidis E, Davidson EJ, Koliopoulos G, et al (2002). Bleeding after loop electrosurgical excision procedure performed in either the follicular or luteal phase of the menstrual cycle: a randomized trial. *Obstet Gynecol*, **99**, 997-1000.

Pfaendler KS, Mwanahamuntu MH, Sahasrabuddhe VV, et al (2008). Management of cryotherapy-ineligible women in a "screen-and-treat" cervical cancer prevention program targeting HIV-infected women in Zambia: lessons from the field. *Gynecol Oncol*, **110**, 402-7.

Prendiville W (1995). Large loop excision of the transformation zone. *Clin Obstet Gynecol*, **38**, 622-39

Samson SL, Bentley JR, Fahey TJ, et al (2005). The effect of loop electrosurgical excision procedure on future pregnancy outcome. *Obstet Gynecol*, **105**, 325-32.

Siriaree S, Srisomboon J, Kietpeerakool C, et al (2006). High-grade squamous intraepithelial lesion with endocervical cone margin involvement after cervical loop electrosurgical excision: what should a clinician do? *Asian Pac J Cancer Prev*, **7**, 463-6