

# The importance of fine needle aspiration biopsy and sonographic evaluation of parametria in cervical cancer

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## Summary

**Objective:** The aim of study was to estimate of the value of fine needle aspiration biopsy (FNAB) and transvaginal ultrasonography (TVS) in the preoperative assessment of the parametria in cervical cancer. We compared parametrial infiltration before and postoperatively by histopathology to verified and confirmed staging of disease. Correct staging qualification, especially evaluation of the parametrium, is very useful in choosing an adequate method of treatment, and thereby in patient survival.

**Material and method:** 52 women (median age 56 years, range 33-85) with cervical cancer in Stage Ib and 49 (median age 51, range 36-71) in Stage II and III, were included in the study. Assessment of parametrial invasion before treatment was performed by fine needle aspiration biopsy (FNAB) with endovaginal ultrasound assistance. The sonographic evaluation of parametria was performed by Siemens Sonoline Versa Pro with a transvaginal 7 MHz mechanical transducer with a biopsy guide and 21-gauge needle. The probe was covered with a disposable latex sheath filled with ultrasound gel. The aspirated material was placed on a glass slide, fixed in 95% alcohol and submitted to cytologic evaluation. All of the patients with cervical cancer in Stage Ib underwent a Wertheim-Meigs hysterectomy. The preoperative findings were compared with data obtained by histopathology findings. Moreover, in the whole group of 101 patients a comparison of FNAB and sonography was performed. The sensitivity, specificity and diagnostic accuracy of this method were evaluated.

**Results:** Parametrial involvement assessed postoperatively by histopathology, in clinical Stage Ib cervical cancer was found in eight of 52 cases (15.4%). FNAB of parametrial involvement in the operated group was accurate in 14 of 18 (accuracy-83%, sensitivity-78%, specificity-84%, PPV-50%, NPV-95%). Sonographic assessment of parametrial involvement was correct in 12 of 18 cases (accuracy-58%, sensitivity-67%, specificity-56%, PPV-24%, NPV-89%). In the whole group of patients (operated and non-operated), sonographic evaluation of parametria verified by FNAB was correct in 104 of 202 cases (accuracy-78%, sensitivity-71%, specificity-86%, PPV-84%, NPV-74%).

**Conclusions:** FNAB and TVS assessment of the parametria are very useful methods in confirmation of neoplastic infiltration. Correct preoperative diagnosis may improve staging, treatment and indirectly, survival of patients with cervical cancer.

**Key words:** Fine needle aspiration biopsy; Ultrasonography; Parametria; Cervical cancer.

## Introduction

Clinical staging of cervical cancer is based on certain assessments concerning the local spread of disease. In Stage I, the parametria are still palpably free while Stage IIb is characterized by palpable shortening of parametria which equals neoplasia infiltration. The diagnosis of parametrial invasion in cervical cancer is traditionally performed by rectal palpation. It is known that histologically demonstrated parametrial involvement often contradicts the clinical stage [1]. Parametrial involvement usually occurs as cancer cell deposits however rarely as parametrial lymph node metastases. The development of the sonography imaging technique provides new applications in the gynaecological oncology field. On the other hand fine needle aspiration biopsy with transvaginal sonography assistance has been successfully used in the assessment of the parametria. However, today it is possible to use more sophisticated diagnostic methods as CT or MRI, but both of these methods and physical examination are difficult and uncertain [2-5].

The aim of our study was to evaluate the value of fine needle aspiration biopsy and ultrasonography of the parametria in cervical cancer.

## Material and Methods

The material included 101 women with cervical cancer established between January 1991 and October 2002 by histopathologic examination of the cervix specimen. Fifty-two (50.2%) patients were in Stage Ib and 49 (49.8%) in Stage II or III. All of them were evaluated by sonographically guided needle aspiration biopsy of parametria. Among them, in 52 patients with Stage Ib, infiltration was verified postoperatively by histopathologic examinations. Clinical examination of the parametria was based on rectal and vaginal examination immediately before investigations. Thickening, shortening and relation to the pelvis bone were assessed. Sonographically the width and echogenicity of the parametria were investigated. Intact sonographic parametrium showed hypoechoic structures with small blood vessels and width not exceeding 12 mm. Infiltrated parametria were characterized by mixed, hyperechoic structures, with diffuse borders and thickening above 12 mm. In all cases (202 parametria performed in 101 patients) we also analyzed correlations between transvaginal sonographic assessment and fine needle aspiration biopsy on each side, and then calculated specificity, sensitivity, diagnostic accuracy positive predictive value (PPV), and negative predictive value (NPV) of these methods (Figures A and B).

In the operative group of 52 patients, the mean age was 56 years (range 33-85 years) and in the non-operative group of 49 women, 51 years (range 37-71). In the first group of 49 cases

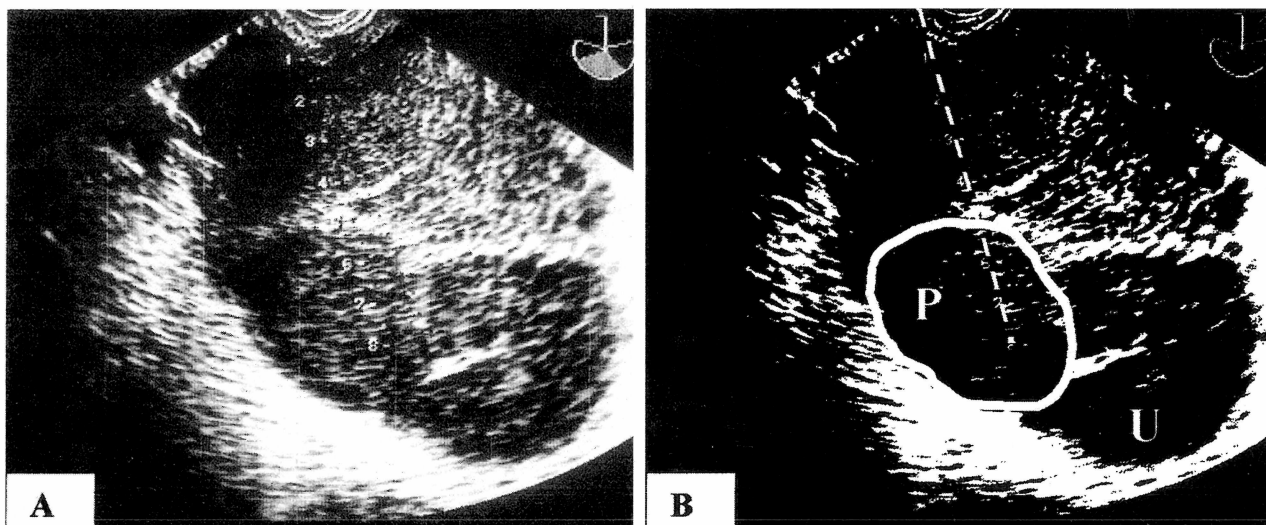


Figure A: Fine needle aspiration biopsy of parametria. - NS image.

B: P = parametrium. U = uterus. The dotted line indicates the direction of the needle. - Scheme.

squamous cell carcinoma was found in 49 patients, and adenocarcinoma of the cervix in three cases. In the second group squamous cell carcinoma was established.

In every case the sonographic evaluation of the parametria was performed by a Siemens transvaginal 7 MHz mechanical transducer with biopsy guide and a 21-gauge needle, 14 cm long. The aspirated material was placed on glass slides, fixed in 95% alcohol and submitted to cytologic evaluation. Fifty-two patients in clinical Stage Ib underwent a Wertheim-Meigs operation and were evaluated by histopathology, including the corpus, cervix, lymph nodes and parametria. Specificity, sensitivity, diagnostic accuracy, PPV and NPV of the sonography needle biopsy and histopathologic examinations were calculated according to the standard definitions.

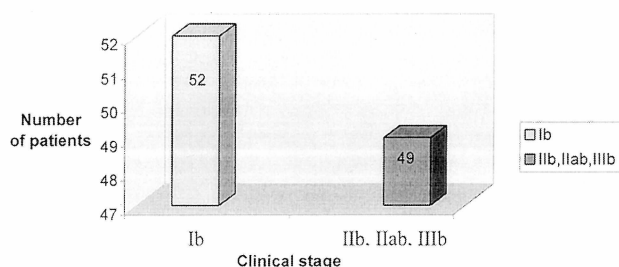


Figure 1. — Clinical stage of cervical cancer.

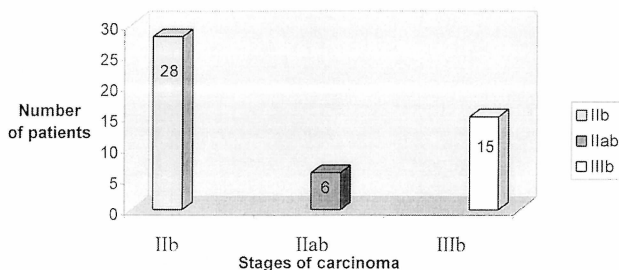


Figure 2. — Non-operative group of cervical carcinoma.

## Results

There was divergence between presurgical (clinical staging) and postoperative (histological) cervical cancer assessment in eight (15.4%) cases. These data are represented in Table 1.

Table 1. — Pathological parametrial involvement in clinical Stage Ib of cervical cancer.

Authors	Stage Ib No. of patients	Parametrial involvement
Zander <i>et al.</i> (1981)	757	133 (17.6%)
Inoue & Okumura (1984)	362	25 (7%)
Matsuyama <i>et al.</i> (1984)	129	20 (15.5%)
Dargent <i>et al.</i> (1985)	43	8 (18.6%)
Kishi <i>et al.</i> (1986)	85	7 (8.2%)
Burghardt <i>et al.</i> (1987)	122	17 (13.9%)
Girardi <i>et al.</i> (1989)	132	15 (11.4%)
Cendrowski, Stelmachów <i>et al.</i> (2002)	52	8 (15.4%)

Agreement of sonographic guided needle aspiration biopsies of 104 parametria performed on 52 patients in Stage Ib cervical cancer was observed in 14 of 18 cases (accuracy-83%, sensitivity-78%, specificity-84%, PPV-50%, NPV-95%). Results and diagnostic value of preoperative FNAB of the parametria and histological postoperative evaluation are shown in Table 2.

Table 2. — FNAB vs parametrial involvement confirmed by histology in Stage Ib cervical cancer.

FNAB	Histology		Total
	Positive	Negative	
Positive	14	14	28
Negative	4	72	76
Total	18	86	104

Accuracy = 83%; Sensitivity = 78%; Specificity = 84%; PPV = 50%; NPV = 95%.

An endosonographically correct assessment of involved parametria was diagnosed in 12 of 18 cases, accuracy 58% (sensitivity-67%, specificity-56%, PPV-24%, NPV-89%).

Results and diagnostic value of preoperative sonographical and postoperative histological evaluation of parametria are shown in Table 3.

Table 3. — Sonographic evaluation of the parametria vs parametrial involvement confirmed by histology in Stage Ib cervical cancer.

TVS	Histology		Total
	Positive	Negative	
Positive	12	38	50
Negative	6	48	54
Total	18	86	104

Accuracy = 58%; Sensitivity = 67%; Specificity = 56%; PPV = 24%; NPV = 89%.

In the operative and non-operative group of 101 patients with cervical cancer in Stage Ib, IIb, IIab and IIIb, 202 sonographically guided needle aspiration biopsies were performed. Correct transvaginal sonographic assessment vs fine needle aspiration biopsy on each side was 78% (74/104), (sensitivity-71%, specificity-86%, PPV-84%, NPV-74%).

The diagnostic value of sonography and fine needle aspiration biopsy of parametria is shown in Table 4.

Table 4. — Sonographic evaluation of the parametria vs FNAB in Stage Ib, IIb, IIab, IIIb.

TVS	FNAB		Total
	Positive	Negative	
Positive	74	14	88
Negative	30	84	114
Total	104	98	202

Accuracy = 78%; Sensitivity = 71%; Specificity = 86%; PPV = 84%; NPV = 74%.

## Discussion

FIGO staging is clinical and is based on pre-therapeutic assessment. This obviously means that there could be discrepancies between presurgical, clinical and postsurgical evaluations. In our study there was a 15.5% incorrect clinical estimation of the parametria (Table 1).

Many authors contend that disagreement of clinical examination, even in general anesthesia and postoperative, histological estimation could be near 20-30%. According to others authors, that incorrect estimation may even reach 40% [6, 7]. Van Nagell concluded that microinvasive involvement of parametria or obesity, making difficult gynecological examination, are the most frequent reasons of not properly clinical assessment [8]. Zander [7] showed incorrect clinical staging of cervical cancer in 17%, Matsuyama [9] in 15.5%, Dargent [10] in 18.6%, Burghardt [11] in 13.9% and Girardi [12] in 11.4%.

Inoue & Okumura [13] and Kishi [14] in their studies reported more reliable outcomes in the clinical assess-

ment of the parametria, respectively, in 7% and 8.2% of cases. Indeed, one of the most important aspects of surgery is to provide an accurate and precise staging on actual cancer spread. Thus, pathological staging describes the spread of disease in terms of the actual situation. In order to have a homogeneous reference point, which allowed us to assess our results, we carried out an analysis of the data obtained from patients who were suffering from pathologically classified Stage Ib disease.

The evaluation of parametria is traditionally performed by physical examination, exactly by rectal palpation. Results of palpation are subjective and uncertain [15]. Development of new diagnostic methods as CT or MRI created hope for an objective evaluation of parametrial invasion [3, 5]. These methods were not applicable due to price, possibility of radiation and unsatisfactory diagnostic accuracy. Development of transvaginal and transrectal sonography allows us to use them successfully in the assessment of parametria [16, 17].

The main problem of ultrasound imaging in oncology is the inability of performing tissue characterization, meaning that there is considerable difficulty in distinguishing malignant from inflammatory disease or fibrosis. Aoki and Hata [18] evaluated the value of transrectal ultrasound in the assessment of the parametria. They reported low sensitivity and PPV, respectively, in 25% and 36.3% of cases. Therefore sonography should always be supplemented by sonographic FNAB in suspected changes. However, although sonography alone is not efficient in the distinction of recurrence from pelvic fibrosis, information gained by transvaginal ultrasound on tumor size, localization and internal structure are of great importance for the accuracy of aspiration biopsy [19-22]. When Zaritzky *et al.* [17] applied sonographic examination in cervical cancer diagnosis interest of this method increased among many investigators. Yuhara *et al.* [16] investigated 108 patients with cervical cancer, using transrectal probe to assess the parametria and obtain histological examination in 29 cases. Similarly, sensitivity and PPV of TVS in parametrial involvement in our material were not satisfactory, and reached 67% and 24%, respectively.

The reported accuracy rates of FNAB have ranged from 74% to 96% [23, 24]. Lemieszczuk *et al.* [25] evaluated the parametria with transvaginal sonographically guided FNAB in patients with clinically suspected relapse of cervical carcinoma. Diagnostic accuracy of FNAB was 82% and sensitivity 61% but sonographic accuracy rate was 77%. Sevin *et al.* [26] in their study reported that accuracy of FNAB is about 33% higher than conventional methods. Cendrowski *et al.* [27] reported that transvaginal needle aspiration biopsy of parametria in cervical carcinoma in Stage Ib, performed on 27 patients, was accurate in 89%. According to Burghardt *et al.* there is a little influence of sole parametrial involvement on survival, but the coexistence of parametrial and pelvic lymph nodes involvement does affect survival [28].

## Conclusion

These results suggest that fine needle aspiration biopsy and sonography are very important methods for preoperative assessment of the parametria in cervical cancer.

Although sonographic biopsy of the parametria is relatively difficult, it is safe, quick and well accepted by the patients. It is a conjunction of two complementary diagnostic methods: an excellent tool for imaging and biopsing the parametria. Ultrasound is an excellent first step for evaluating the parametria in cervical cancer. However in assessing the parametria, besides clinical evaluation, FNBP should be speculated as the most important tool. This method is accurate, sensitive and with high specificity. Preoperative assessment of the parametria may improve staging, treatment and indirectly, survival of patients with cervical cancer.

## References

- [1] Carena L., Villani C.: "Parametrial involvement and therapeutic programming in Stage Ib cervical cancer". *Bailliere's Clinical Obstetrics and Gynaecology*, 1988, 2 (4).
- [2] Franchi M., Fianza A. *et al.*: "Clinical value of computerized tomography in assessment of recurrent uterine cancer". *Gynecol. Oncol.*, 1989, 35, 31.
- [3] Lee J.K.T.: "The role of MR imaging in staging of cervical carcinoma". *Radiology*, 1988, 166, 895.
- [4] Sironi S., Belloni C., Taccagni G.L.: "Carcinoma of the cervix: value of MR imaging in detecting parametrial involvement". *Am. J. Reprod.*, 1991, 156, 753.
- [5] Walsch J.W., Goplerud D.R.: "Prospective comparison between clinical and CT staging in primary cervical carcinoma". *Am. J. Reprod.*, 1981, 137, 997.
- [6] Averette H.E.: "Staging of cervical cancer". *Clin. Obstet. Gynecol.*, 1975, 18, 215.
- [7] Zander J., Baltzer J., Lohe K.J.: "Carcinoma of the cervix: an attempt to individualize treatment. Results of a 20-year cooperative study". *Am. J. Obstet. Gynecol.*, 1981, 139, 752.
- [8] Van Nagell J.R., Roddick J.W., Lowin D.M.: "The staging of cervical cancer: inevitable discrepancies between clinical and pathological findings". *Am. J. Obstet. Gynecol.*, 1997, 110, 973.
- [9] Matsuyama T., Inoue I., Tsukamoto N.: "Stage Ib, Iia and Iib cervix cancer, postsurgical staging and prognosis". *Cancer*, 1984, 54, 3072.
- [10] Dargent D., Frobert J.L., Beau G.: "V factor (tumor volume) and T factor (FIGO classification) in assessment of cervix cancer prognosis: the risk of lymph node spread". *Gynecol. Oncol.*, 1985, 22, 15.
- [11] Burghardt E., Pickel H., Haas J., Lahousen M.: "Prognostic factors and operative treatment of Stages Ib to Iib cervical cancer". *Am. J. Obstet. Gynecol.*, 1987, 156, 988.
- [12] Girardi F., Lichtenegger W., Tamussino K., Hass J.: "The importance of parametrial lymph nodes in the treatment of cervical cancer". *Gynecol. Oncol.*, 1989, 34, 206.
- [13] Inoue T., Okumura M.: "Prognostic significance of parametrial extension in patients with cervical carcinoma Stages Ib, Iia and Iib. A study of 628 cases treated by radical hysterectomy and lymphadenectomy with or without postoperative irradiation". *Cancer*, 1984, 54, 1714.
- [14] Kishi Y., Inui S., Sakamoto Y., Mori T.: "A clinico-pathological evaluation of parametrial involvement of deep invasive carcinoma of the uterine cervix". *Eur. J. Obstet. Gynecol.*, 1986, 7, 18.
- [15] Van Voorhis L.: "Carcinoma of the cervix". *Am. J. Obstet. Gynecol.*, 1970, 108, 115.
- [16] Yuhara A. *et al.*: "Use of transrectal radial scan ultrasonography in evaluating the extent of uterine cervical cancer". *J. Clin. Ultras.*, 1987, 115, 507.
- [17] Zaritzky D., Blake D. *et al.*: "Transrectal ultrasonography in the evaluation of cervical carcinoma". *Obstet. Gynecol.*, 1979, 53, 105.
- [18] Aoki C., Hata T.: "Parametrial invasion of uterine cervical cancer assessed by transrectal ultrasonography; preliminary report". *Gynecol. Oncol.*, 1990, 36, 82.
- [19] Belinson J., Lynn J. *et al.*: "Fine-needle aspiration cytology in management of gynaecologic malignancies". *Acta Cytol.*, 1968, 30, 59.
- [20] Nordqvist S., Stevin B. *et al.*: "Fine-needle aspiration cytology in gynecologic oncology. I. Diagnostic accuracy". *Obstet. Gynecol.*, 1979, 54, 719.
- [21] Osmers R., Bergholz M., Kuhn W.: "Vaginal sonographic visualization of a cervical carcinoma". *Int. J. Obstet. Gynecol.*, 1989, 28, 283.
- [22] Shepherd J., Cavanagh D. *et al.*: "The value of needle biopsy in the diagnosis of gynecologic cancer". *Gynecol. Oncol.*, 1981, 11, 309.
- [23] Moriaty A., Giant M., Stehman F.: "The role of fine-needle aspiration cytology in the management of gynaecologic malignancies". *Acta Cytol.*, 1968, 30, 59.
- [24] Bottles K.: "Fine-needle aspiration biopsy in the management of cervical carcinoma following primary therapy". *Gynecol. Oncol.*, 1987, 28, 68.
- [25] Lemieszczuk B., Bidziński M. *et al.*: "Clinical value of transvaginal, sonographically guided fine needle aspiration biopsy of parametria in recurrent cervical carcinoma". *Eur. J. Gynaecol. Oncol.*, 1993, 14 (suppl.), 68.
- [26] Sevin B., Greenings S. *et al.*: "Fine-needle aspiration cytology in gynecologic oncology. Clinical aspects". *Acta Cytol.*, 1979, 23, 277.
- [27] Cendrowski K., Śpiewankiewicz B., Sawicki W., Stelmachów J.: "The role of preoperative biopsy of parametrium in cervical cancer staging". *Advances on Gynecological Oncology*. Rome, CIC Ed. Int., 1995, 22.
- [28] Burghardt E., Haas J., Girardi F.: "The significance of parametrium in the operative treatment of cervical cancer". *Bailliere's Clinical Obstetrics and Gynaecology*, 1988, 2 (4).

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