

Five Classes of Extended Hysterectomy for Women With Cervical Cancer

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Five classes of extended hysterectomies used in treating women with cervical cancer are described. The term "radical hysterectomy" is not adequate to record and communicate the different amounts of therapy attempted and the subsequent risk of complications. Describing the technical features of five operations enables us to more accurately evaluate our results and provides a better understanding of the need to tailor each patient's treatment by using an operation that is adequate but not excessive.

THE PLACE of primary surgery for patients with carcinoma of the cervix is still debated. The use of supervoltage radiation with its ability to deliver a more homogeneous distribution of radiation to the tumor while vastly sparing the normal pelvic structures has only heightened the debate. Moreover, the term "radical hysterectomy" connotes many different operations among surgeons. Confusion exists in evaluating the results and complications of radical hysterectomy for women with cervical cancer because of the lack of definitions of the procedures involved. As we define our exact technics in evaluating the results of radiation therapy, surgeons must define the details of the surgical procedure used in treating women with cervical cancer. The purpose of this communication is to describe five classes of extended hysterectomies used in treating women with cervical cancer, the differentiating steps of which were originally outlined by one of us (FR).

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DESCRIPTIONS

In defining the details of the five classes of hysterectomies, particular differences will be ascribed to the management of the uterine and superior vesical arteries, ureters, cardinal ligaments, uterosacral ligaments, and the vagina. Other steps for performing hysterectomies have been deleted. The Class I (TeLinde modification) hysterectomy is not truly a radical hysterectomy but does extend beyond the excision boundaries of a conservative or standard hysterectomy. It is included only for completeness. An evaluation of results of Class I procedures is not included in this report.

Class I (TeLinde Modification)

The aim of the Class I hysterectomy is to insure removal of all cervical tissue. Deflection and retraction of the ureters laterally without dissection from the ureteral bed allows one to clamp the adjacent paracervical tissue without dissecting into the side of the cervical tissue itself. To accomplish this, minor technical changes are practiced as a preliminary to dividing the parametrium. The uterine and upper vaginal vessels are exposed by cutting that portion of the pubocervical ligament which covers these structures anteriorly and also by preliminary dissection and separation of the posterior sheath of the broad ligament. Improved exposure permits ligation of this vasculature with much smaller pedicles and less contracture of these tissues. With this freedom the paracervical tissues drop away from the cervix to allow the ureter to be deflected

laterally. This insures complete removal of the cervix. At the M. D. Anderson Hospital, Class I operations are used primarily for in situ and microinvasive carcinomas. Class I surgery is also performed after preoperative irradiation in adenocarcinoma of the cervix and after preoperative irradiation in the barrel-shaped endocervical carcinomas. This operation represents the extrafascial hysterectomy employed at M. D. Anderson Hospital as combination irradiation and operation for some cancers of the cervix.

Class II

The Class II extended hysterectomy is a moderately extended radical hysterectomy. The purpose of the Class II hysterectomy is to remove more paracervical tissue, while still preserving the blood supply to the distal ureters and bladder. The ureters are freed from the paracervical position but are not dissected out of the pubovesicle ligament. Ligation of the uterine vessels just medial to the ureters insures preservation of the distal ureteral blood supply (Figure 1). The uterosacral ligaments are resected midway between the uterus and their sacral attachments (Figure 2). The medial half of the cardinal ligament is removed, as is the upper one-

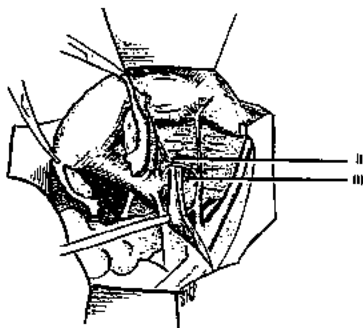


Fig 1. In a Class II hysterectomy the uterine artery is ligated medial to the ureter, whereas in a Class III it is ligated as it originates from the internal iliac artery.

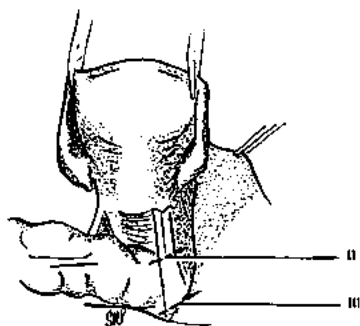


Fig 2. In a Class II hysterectomy the uterosacral ligaments are divided midway between the uterus and their sacral attachments. In a Class III operation the uterosacral ligaments are excised at their sacral attachments.

third of the vagina (Figures 3 and 4). Pelvic lymphadenectomy is elective with the Class II hysterectomy.

A Class II operation is considered suitable as the complete treatment for: a) microinvasive carcinomas when, in an unusual situation, there is some question about

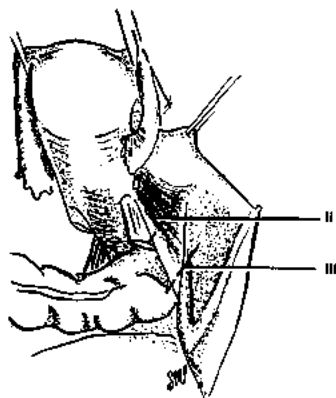


Fig 3. The medial one-half of the cardinal ligament is removed in a Class II hysterectomy. In a Class III operation the cardinal ligament is removed at the pelvic wall.

HYSTERECTOMY

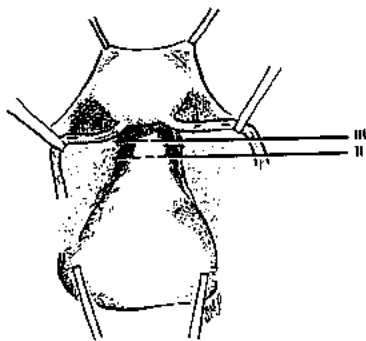


Fig 4. The upper one-third of the vagina is removed in a Class II hysterectomy and one-half in a Class III procedure. Not illustrated is removal of three-fourths of the vagina in Class IV hysterectomy.

the depth that remains after conization, and b) small postirradiation recurrences limited to the cervix.

Class III (Meigs')

The aim of a Class III procedure is wide radical excision of the parametrial and paravaginal tissues, in addition to removal of the pelvic lymphatics. The uterine artery is ligated as it originates from the internal iliac artery (Figure 1). Dissection of the ureter from the pubovesicle ligament is complete to entry into the bladder except that a small lateral portion of the pubovesicle ligament between the lower end of the ureter and the superior vesicle artery is preserved, thus maintaining some blood supply to the distal ureter (Figure 5). The hazard of fistula formation is decreased by preservation of the superior vesicle artery with a portion of its associated pubovesicle ligament. The uterosacral ligaments are excised at their sacral attachments (Figure 2) and the cardinal ligaments are resected at the pelvic wall (Figure 3). One-half of the vagina is removed (Figure 4). Pelvic lymphadenectomy is routinely performed with Class III operations.

For the young patient with a small in-

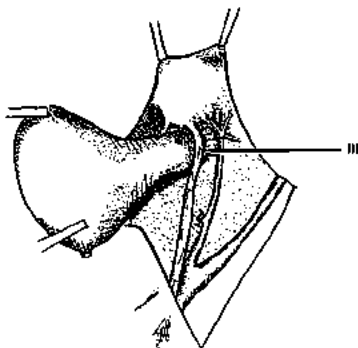


Fig 5. In a Class III hysterectomy the ureter is dissected from the pubovesicle ligament superiorly, medially, and inferiorly. A small lateral portion of the pubovesicle artery is preserved, thus maintaining some blood supply to the distal ureter.

vasive lesion (Stage I to IIA) a Class III operation is performed. This would allow preservation of ovarian function. The Class III operation is also used for central recurrences after radiation therapy when it seems that the rectum and bladder are not involved.

Class IV

The aim of the Class IV radical hysterectomy is the complete removal of all periureteral tissue, a more extensive excision of the perivaginal tissues, and, when indicated, excision of the internal iliac vessels along that part of the pelvic wall. This differs from a Class III operation in three aspects: a) the ureter is completely dissected from the pubovesicle ligament (Figure 6), b) the superior vesicle artery is sacrificed (Figure 6), and c) three-fourths of the vagina is excised.

This procedure is used for more extensive anteriorly occurring central recurrences when it is considered that preservation of the bladder is still possible. This extension of the dissection laterally is needed when metastases occupy the parametrium. Sacrifice of the blood vessels to the bladder becomes unavoidable. The risk of fistulas increases.

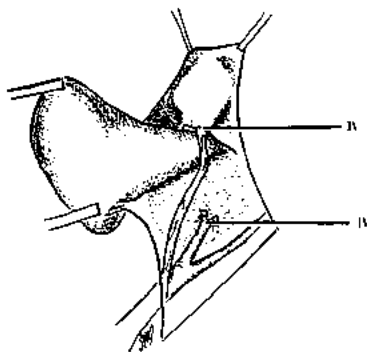


Fig 6. The superior vesicle artery is sacrificed in a Class IV operation. Also, the ureter is completely dissected from the pubovesical ligament.

Class V

The aim of the Class V hysterectomy is removal of central recurrent cancer involving portions of the distal ureter or bladder. It is different from a Class IV operation in that an involved portion of the distal ureter or bladder is excised (Figure 7). A reimplantation of the ureter into the bladder as ureteroileoneocystostomy is then performed.

MATERIALS AND METHODS

During the years 1954 through 1966, 114 extended abdominal hysterectomies were performed. The histology of this series included squamous carcinoma, 97 cases; adenocarcinoma, 10 cases; adenosquamous carcinoma, 1 case; and squamous carcinoma in situ, 6 cases. Table 1 shows the total number of women in each group and whether the operation was a) primary therapy, b) coincident with preoperative radiotherapy, or c) recurrent after irradiation therapy. Preoperative radiotherapy was not planned except for the large, barrel-shaped Stage IIB endocervical lesions (3 patients). Five women had received partial radiation therapy elsewhere and following referral for additional radiotherapy treatment, it was con-

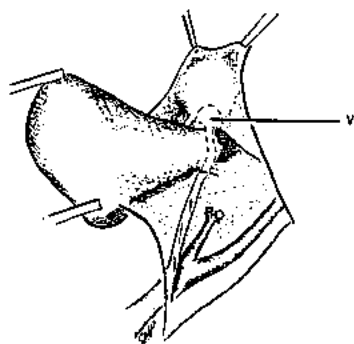


Fig 7. In a Class V operation an affected portion of the distal ureter or bladder is excised (dotted area).

sidered inadvisable to give additional radiotherapy by a different method. In the other cases of preoperative irradiation, therapy was discontinued and was followed by extended hysterectomy for the following reasons: uterine perforation at the time of radium insertion (3), inability to insert radium (3), parametritis from radium (3), failure to abort after external radiotherapy (3), lack of regression of the cancerous lesion during radiotherapy (3), miscellaneous (3).

TABLE 1. RELATION OF SURGERY TO OVERALL THERAPY AMONG 114 PATIENTS HAVING EXTENDED HYSTERECTOMIES FOR CERVICAL CARCINOMA, 1954-1966

Stage*	Relation of surgery to overall treatment			Total patients
	As primary treatment	With radiotherapy	Recurrence after radiotherapy	
0	6	0	—	6
IA	35	0	—	35
IB	11	13†	—	24
IIA	2	5	—	7
IIB	0	8	—	8
Recurrent	—	—	34	34
TOTALS	54	26	34	114

* International classification

† One with postoperative radiation therapy

HYSTERECTOMY

RESULTS

Complications

Table 2 shows the complications in relation to the class of hysterectomy. In the group with Class II operations 56% of the women had no major complications as compared to 20% for Class III and 0% for Class IV and V hysterectomies. There were 10 vesicovaginal fistulas, all of which occurred after previous radiotherapy: 1 patient (2.1%) of the 48 Class II hysterectomies, 6 (10.3%) of the 58 Class III's, 2 (50%) of the 4 Class IV's, and 1 (25%) of the 4 Class V's. This is an incidence of 8.7% of the total patients and 16.6% of the 60 women having previous radiotherapy followed by radical hysterectomy. Only 2 (1.7%) ureteral vaginal fistulas occurred, both with Class III radical hysterectomies. One of these 2 women had had previous radiotherapy. Ureteral stricture (as demonstrated by intravenous pyelogram) was a significant complication. This occurred in 11 women, 9 of whom had previous radiotherapy. Only 2, however, developed a subsequent ureteral vaginal fistula. Table 3 demonstrates that the urinary tract receives the greatest insult from the operation. Besides those complications already reviewed, a significant number of women develop marked hydronephrosis and bladder atony.

Lymphocysts occurred in 14 women who had lymphadenectomies. In 2, the lymphocysts became infected, while 7 others had

TABLE 2. SUBSEQUENT COMPLICATIONS IN 114 PATIENTS HAVING EXTENDED HYSTERECTOMIES FOR CERVICAL CARCINOMA—BY CLASS OF HYSTERECTOMY

Class	Compli- cations (No. patients)	No compli- cations (No. patients)	Total patients
II	21	27	48
III	45	12	58
IV	4	0	4
V	4	0	4
TOTALS	75	39	114

TABLE 3. URINARY TRACT COMPLICATIONS SUBSEQUENT TO HYSTERECTOMIES IN 114 PATIENTS

Complication	No. of patients
Ureterovaginal fistula	2
Vesicovaginal fistula	10
Ureteral stricture	11
Severe hydronephrosis	18
Bladder atony	26
Urinary incontinence	15
Urinary tract infection	30

concomitant severe hydronephrosis. The latter may have been caused by the lymphocysts. Only 4 of the patients had the lymphocysts surgically drained. Other major complications included rectovaginal fistula (2), major pelvic abscess (7), major wound infections (7), major cuff abscess (4), major cardiorespiratory complications (7), and severe leg edema (2). Two deaths occurred postoperatively.

Survival

In Situ and Microinvasive Carcinoma. Six women with in situ carcinoma and 33 with microinvasive carcinoma underwent Class II and III operations. There was a 100% 5-year survival without evidence of malignancy in both groups. (Two women were excluded, 1 dying from intercurrent disease and 1 from a second malignancy, both without evidence of recurrent cervical cancer.) In those patients undergoing pelvic lymphadenectomy no pelvic metastases were encountered.

Stage IB Carcinoma. Of the 24 women with Stage IB carcinomas of the cervix undergoing Class II or III operations, 13 had had preoperative radiation therapy. Radical hysterectomy was subsequently performed because of incomplete radiation therapy at another institution or complications of local radium. Of the women with Stage IB lesions, 73% survived 5 years without evidence of recurrence (Table 4).

Stage IIB Carcinoma. Eight women with Stage IIB carcinoma (parametrial extension) underwent Class II and III operations after a

TABLE 4. FIVE-YEAR SURVIVAL DATA FOR 24 PATIENTS HAVING CLASS II AND CLASS III HYSTERECTOMIES FOR STAGE IB CERVICAL CARCINOMA

After five years	Class II		Class III		Total patients
	No RT	RT	No RT	RT	
Alive without cancer	4(80%)	2(66.6%)	4(80%)	6(66.6%)	16(73%)
Dead with cancer	1	1	1		3
Dead from complications				3	3
Dead of intercurrent disease [†]			1*	1*	2*

* Excluded from percent survival calculations; † No evidence of recurrent disease; RT = Radiation therapy

minimum of 4000 rads whole pelvis radiotherapy. The indications for operation included inability to insert radium (5), and large endocervical lesions (3). Six of 8 women (75%) survived 5 years without evidence of disease. The 3 women undergoing Class II operations survived, and 3 of 5 survived after Class III hysterectomy.

Recurrent Carcinoma. Excluding 4 women who died from intercurrent disease without evidence of recurrent cervical cancer, 50% of the patients undergoing Class II, III, IV, and V operations were without evidence of recurrent tumor at 5 years (Table 5). One-third of the women undergoing Class II operations were without evidence of recurrent disease, while 53% of those undergoing Class III operations survived without evidence of recurrent tumor at 5 years. There were no survivors in the group having the Class IV operation alone; however, none of the patients undergoing Class V operation had recurrence of their cervical cancer.

Survival and Pelvic Node Metastases. Seventy-seven women had pelvic lymphadenectomy performed concomitant with radical hysterectomy. Seven had demonstrable node metastases and none survived. Five died from recurrent cervical cancer and 2 from complications of therapy. Only 1 patient with node metastases received postoperative radiation therapy.

DISCUSSION

The need for extended hysterectomy and the range of resection required will vary. The range of extended hysterectomy will vary

with the amount of spread of the primary tumor and whether prior irradiation has seriously impaired the healing ability of these tissues. It is well known that high-dose irradiation and very radical hysterectomy create an intolerable incidence of serious complications. Yet for some patients adequate treatment and safety can be achieved by more moderate extended hysterectomy, permitting a planned treatment which employs both irradiation and operation, or allows operation when irradiation therapy encounters obstacles and treatment must be switched to extended hysterectomy.

Several operations which extend the range of the hysterectomy are useful for the treatment of patients with carcinoma of the cervix. Thus, the term "radical hysterectomy" is inadequate to define the different types of surgery performed and the risk of compli-

TABLE 5. FIVE-YEAR DATA ON RECURRENCE OF CERVICAL CARCINOMA FOR 34 PATIENTS HAVING CLASS II, III, IV, AND V HYSTERECTOMIES

After five years	Class II	Class III	Class IV	Class V	Total patients
Alive without cancer	3	9*	1 [†]	2	15(50%)
Dead with cancer	4	6	2	0	12
Dead from complications	2	1	0	0	3
Dead of intercurrent disease [‡]		1	1	2	4 [†]

* One developed vaginal recurrence, with no evidence of recurrence after transvaginal radiotherapy.

[†] No evidence of recurrence after pelvic exenteration.

[‡] No evidence of recurrent disease.

[§] Excluded from percent survival calculations.

HYSTERECTOMY

cations. In describing the extent of surgery of the five operations employed, we have improved the communication among our staff.

The proper use of the extended hysterectomy in patients with cervical cancer is still being investigated. It seems evident that it is not needed for *in situ* cervical cancer. Its value for microinvasive disease is still unsettled, with most surgeons performing simple hysterectomy with a resulting high 5-year survival rate.¹ Although many large series show a 2 to 3% incidence of nodal metastases with Stage IA disease,²⁻⁸ it would seem unnecessary to totally remove the cardinal ligament as in Meigs' operation (our Class III). A less radical procedure (our Class II) with or without removal of the pelvic nodes should be adequate.

Surgery and irradiation are equally effective when the cancerous cervical lesion is no greater than 1 cm because the incidence of nodal metastases is so low. Friedel and Graham reported that in 40 cases of cervical carcinoma where the lesion measured less than 1 cm there was no case of metastatic tumor in pelvic nodes. In their patients with lesions measuring 1.1 to 2 cm, the incidence of pelvic node metastases was 14%; it was 29% when the lesion measured greater than 2.1 cm.⁴ Primary surgery is favored for a young patient with a cervical lesion less than 1 cm in size because of the opportunity to preserve ovarian function. There is an incidence of node metastases of approximately 15% with lesions greater than 1 cm.⁵ Moreover, the cure rate in those patients with positive nodes is very low.⁶⁻⁸ In this institution the overall cure rate by radiotherapy alone for Stage IB lesions is 90%,² and the complication rate is quite low. Of 1030 women with Stage I & II cervical cancer treated by irradiation only at MDAH, June 1954-Sept 1966, 54 (5.2%) had significant complications; 22 of these complications either required surgical correction or remained permanently.¹⁰

Pelvic nodes found inoperable at the time of radical hysterectomy are rarely cured by radiation therapy given postoperatively.¹¹

When the lesion has spread to the parametrial tissues (Stage IIB), radiotherapy is preferred. The proximity of the bladder, ureters, and rectum precludes obtaining adequate surgical margins. The use of radical hysterectomy in place of pelvic exenteration for recurrences of cancer in or about the cervix has the obvious advantage of preservation of bladder and bowel continuity.

A Class II hysterectomy is a modified radical operation. It is more radical than a Class I operation because of the additional parametrial and vaginal tissues removed. However, it is less radical than the Class III (Meigs') operation in that the pubovesical ligament is preserved and only the medial one-half of the cardinal ligament is excised. Preserving the pubovesical ligament has the advantage of maintaining the ureteral and bladder blood supply.

In 48 Class II hysterectomies there was only one vesicovaginal fistula and no ureteral vaginal fistulas. This singular fistula occurred when a Class II operation was performed for disease recurring after radiation therapy. The 5-year survival rate for women undergoing this operation for microinvasive disease was 100%, and there were no serious complications in this group. Class II operations were also performed when radiotherapy could not be completed. It was equally effective in these instances for Stage I and II lesions. Class II operations for disease recurring after full radiation would seem inadvisable because of the possibility of leaving behind cancerous tissue by not removing the entire cardinal and pubovesical ligaments. The Class III operation for recurrent disease produced better results, which speaks against the lesser operation.

A Class III (Meigs') extended operation is a truly radical hysterectomy. This procedure involves as wide an excision as possible of the cardinal and uterosacral ligaments. A

portion of the lateral aspect of the pubovesicle ligament is preserved to reduce the incidence of vesicle and ureterovaginal fistulas. This operation should result in a very high cure rate for cervical cancers measuring less than 1 cm and should match the cure rate for radiation therapy for similar lesions. In the young patient, surgery has the advantage of preserving ovarian function. This is too radical a procedure for microinvasive carcinoma. For lesions greater than 1 cm with their attendant high incidence of node metastases, radiotherapy is preferred in this clinic. The Class III operation for cancer recurring in or about the cervix after radiation therapy seems justifiable by a 5-year survival rate of nearly 50%.

The incidence of vesicovaginal fistulas with Class III operations was 10.3%; however, all occurred when the operation was performed after previous pelvic radiotherapy. Two ureteral vaginal fistulas (3.4%) occurred with Class III hysterectomies, with 1 of the women having had prior radiotherapy.

The value of the Class IV and V operations cannot be attested to because of the small number of cases. However, the 2 patients surviving 5 years after Class V operations when the urterovesical junction was involved, with preservation of bladder function, is encouraging. No ureteral vaginal fistulas occurred with the Class IV and V operations. However, 3 of the 8 women, all of whom had had prior radiotherapy, developed vesicovaginal fistulas.

The proper use of radical hysterectomy and pelvic lymphadenectomy for women with cervical cancer remains debatable. By defining the details of the operative procedure utilized, it will be possible to more accurately evaluate the surgical results, and a

better understanding of the effectiveness of radical hysterectomy in the treatment of this disease will be provided.

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