Progress of Radical Surgery for Gynaecological Malignancies Throughout the 20th Century

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Summary

The surgical treatment of gynaecological malignancies lies in team approach by the experts in this field. Stallworthy (1976) firmly believes that the days are gone when a patient with gynaecological malignancy could be treated by a surgeon or a radiotherapist working in isolation.

There are two satisfactory methods of therapy — surgery and radiotherapy. There has been tremendous progress in radical surgery of gynaecological malignancies during 20th century. Decision should be taken as to which one of the therapy is better in a particular patient. Some patients may be cured by one method and not by the other. Sometimes, when one method fails, the other may have to be used. The treatment centre should have trained gynaecologic oncologists, pathologists, radiotherapists, cytologists and radiobiologists. There should be sufficient number of cases in such centres to maintain the high degree of skill of the specialists. Periodic analysis of data of the results of different lines of therapy in a large co-operative study may yield an answer.

Cancer of the cervix: is the commonest type of malignancy among Indian women with about 1,00,000 new cases registered every year. Most of the women with cervical cancer come to hospitals in India in advanced stages — stages III & IV — about 70% cases. Definite cure is readily achieved when cervical cancer is minimal but nearly impossible if the tumour is given time to grow & spread to the pelvic wall or into adjacent structure such as bladder and rectum. The sooner all tumours are detected and treated, the better is the chance of cure. Cytology and colposcopy developed in the 20th century are important tools in the irradication of cervical cancer.

Of the two modalities of treatment of invasive cervical cancer in early stages (Stage I & II) surgery and radiotherapy may be equally efficacious but radical surgery may be method of choice in our country for the coming 20-25 years in the present millennium as out of about 120 Medical Colleges only in 60 and out of 40 cancer institutions in India, in about 30 there are facilities of radiotherapy. In near future there may not be ideal radiotherapy set up in many of these places.

Historical perspective of surgical treatment of cancer of the cervix: Throughout end of 19th century and the 20th century radical surgery for treatment of cancer of the cervix saw the golden years in its perfection (Currie, 1971).

Surgical Treatment of Cancer of the Cervix

Freund (1878)—Total Abdominal Hysterectomy with removal of enlarged lymphnodes.
Reis, Clark (1895) — Radical Abdominal Hysterectomy.
Wertheim (1900) — Radical Abdominal Hysterectomy with selective pelvic lymphadenectomy. (1898-1905)
Schauta (1908) — Radical Vaginal Hysterectomy. (1901-1908)
Amreich (1955) — Modified Radical Vaginal Hysterectomy.

Bonney (1932) — Radical Abdominal Hysterectomy with pelvic lymphadenectomy done routinely.

Mitra (1954) — Radical Vaginal Hysterectomy with extraperitoneal pelvic lymphadenectomy.

Brunschwig (1965) — Pelvic exenteration operation.

Okobayashi (1921) — Modified Radical Abdominal Hysterectomy to preserve normal bladder innervation.

Dargent (1994) — Extra peritoneal laparoscopic pelvic lymphadenectomy + Vaginal Radical Hysterectomy

Freund (1878) in Germany first performed total abdominal hysterectomy for cases of cervical cancer with a primary operative mortality as high as 70%. Almost at the same time Czerny (1882) in Austria did vaginal radical hysterectomy with a primary mortality of 26%.

Wertheim (1900) from Vienna developed abdominal radical hysterectomy with selective removal of the pelvic lymphnodes and parametrium. Almost at the same time, Schauta (1908) in Vienna started doing radical vaginal hysterectomy (1901-1908) showing considerable improvement in the primary mortality rate:

Wertheim's Operation — 18.6% versus
Schauta's operation — 2.3%

Due to high primary mortality and increased incidence of urinary and bowel fistulae as complications, the surgical treatment of cervical cancer was replaced by radium and deep x-ray therapy after its discovery in 1925. Radiotherapy remained the most popular method of treatment of cancer of the cervix in Europe and USA due to development of a few important centres of Radiotherapy. Subsequently due to improved surgical technique and lowering of post-operative complications by Victor Bonney (1932) in the UK and Meigs (1954) in the USA. radical abdominal hysterectomy again became popular and replaced radiotherapy as the primary method of treatment. By adding extra peritoneal pelvic lymphadenectomy to the radical vaginal hysterectomy of Schauta type, Mitra (1954) proved the superiority of the vaginal technique over abdominal radical surgery. The latter was associated with more postoperative complications like VVF, urethrovaginal fistula & rectovaginal fistula in comparison to radical vaginal surgery (Roy Chowdhury — 1976 and 1988).

Brunschwig (1953) subsequently developed ultra-radical surgery for stage IV cases — anterior exenteration for bladder extension, posterior exenteration for rectal exentension and total exenteration for both bladder and rectum involvement. But due to low operability rate and high mortality rate this operation could not be made popular.

Mitra Operation: Radical vaginal hysterectomy with extraperitoneal bilateral pelvic lymphadenectomy designed by Mitra in 1957 has already established its place in the surgical treatment of cancer of the cervix (Mitra 1951, 1954, 1955, 1957). The operation starts with abdominal extraperitoneal dissection of the pelvic lymph nodes, ligation of the ovarian and uterine vessels and partial mobilisation of the parametria on both sides. Finally, it ends with radical vaginal hysterectomy with extensive removal of the parametria and vaginal cuff. Extraperitoneal lymphadenectomy in this technique is much simpler than transperitoneal pelvic lymphadenectomy. Extraperitoneal ligation of the ovarian and uterine vessels makes vaginal radical surgery easier. By this technique more vaginal and pelvic cellular tissue can be removed with less primary mortality and less risk of injury to the bladder, ureter and rectum. While the abdomino-vaginal approach, as described by Mitra, carried and still carries a low primary mortality and delayed morbidity rates with five-year survival rates comparable to radiotherapy or abdominal radical hysterectomy with pelvic lmphadenectomy, abdominal radical hysterectomy with lymphadenectomy is more extensively used to-day. Better anaesthesia and a good understanding of fluid and electrolyte balance, surgeons being specifically trained in the surgical procedures, availability of blood and antibiotics have all contributed towards making abdominal radical hysterectomy and pelvic lymphadenectomy a popular approach.

In his series of 500 cases of cancer of the cervix operated by Mitra Operation, Roy Chowdhury reported an overall five-year survival rate of 54.9% though in stage I alone it was 76.2% with 1.8% primary mortality and without any urinary or bowel fistula (Roy Chowdhury, 1975, 1976, 1977, 1988).

Treatment plan for different stages of invasive cancer of the cervix developed during 20th century is as

follows:

Stages IA — Microinvasive carcinoma.

Stage IA-1 — Early Stromal invasion (< 1 mm)
No lymph vascular space invasion — simple hysterectomy

Stage IA-2 — 1-3 mm invasion
No lymph vascular space invasion — simple hysterectomy
With lymph vascular space invasion — pelvic lymphnode metastasis less than 1% - Extended Hysterectomy.

Stage IA-3 — 3-5 mm invasion.
Pelvic lymphnode metastasis 5.5% - Hysterectomy with lymphadenectomy.

Stage IB - > 5 mm invasion.
Radical Hysterectomy with Pelvic lymphadenectomy

Stage II A — Non-Bulky lesion Radical Hysterectomy and Pelvic lymphadenectomy.
Bulky lesion (> 3 mm) Preoperative external Radiation followed after 3-4 weeks by: Radical Hysterectomy and Pelvic Lymphadenectomy

Stage IIB — Preoperative external Radiation followed after 3-4 weeks by: Radical Hysterectomy and Pelvic Lymphadenectomy

External Radiation with intra - cavitary Radiation followed after 3-4 weeks by: Radical Hysterectomy and Pelvic Lymphadenectomy.

Stage III — External Radiation followed by Intracavitary Radiation.

Stage IV — Palliative Radiation: External Radiation with Intracavitary Radiation.

In selected cases:
Anterior Exenteration — when bladder involved.
Posterior Exenteration — when rectum involved.
Total exenteration — when both bladder & rectum involved.

Five year survival rate in Radical Surgery for cancer of the cervix in different stages are as follows:

	M.D.Anderson Hospital Radical Operation — Currie, 1971	Radiotherapy M.D.Anderson Hospital, Fletcher, 1973.
Stages	No. of cases = 552	
IB	86.3%	91.5%
IIA	75.0%	83.5%
II B	58.9%	66.5%
Other stages	34.1%	IIIa — 45.0%
		IIIb — 36.0%
		IV — 14.0%

5-Year Survival rate in Pelvic Exenteration by different authors is as follows:

Author/Institution	No. of patients Treated	No. of operative Deaths	No. of 5-year Survival Rate
Brunschwig (1965) Memorial Hospital	86 (15%)	108 (20.1%)	
Bricker et al (1956) Washington University	153	15 (10%)	53 (34.8%)
Symmonds et al (1975) Mayo Clinic	198	10 (8%)	34 (32.3%)
Rutledge et al (1977) M.D.Anderson Hospital	296	40 (13.5%)	97 (33.4%)
Shingleton et al (1989) Edinburgh	143	9 (6.3%)	71 (50%)

Cancer of the Ovary:

Leading cause of death due to gynaecological cancers is ovarian cancer as 70% cases are diagnosed in advanced stages — Stages III & IV. Survival rate depends on tumour residue and maximal cytoreductive surgery. Cytoreduction gives immediate relief from symptoms and gives a better quality of life.

Radical Surgery in ovarian cancer aims at:

A. Primary Laparotomy for:

i) Staging of the disease ii) Maximal cytoreduction iii) Super radical surgery wherever indicated iv) Lymphadenectomy v) Palliative surgery if inoperable

B. Delayed reductive surgery:

i) After initial chemotherapy ii) Following incomplete primary reduction

C. Second look laparotomy

D. Emergency Laparotomy for terminal complications e.g. haemorrhage, intestinal obstruction.

In maximal cytoreductive surgery — all visible tumour tissue should be removed along with its extension, leaving behind minimal or no residual tissue. In addition, pelvic organs should be removed along with greater omentum, resection of the small or large bowel and appendicectomy, partial cystectomy and colostomy if required.

A gynaecologist venturing into Radical ovarian surgery should be trained to perform:

- Enblock pelvic and paraaortic lymphadenectomy.
- Intestinal and bladder surgery (Benghard. — 1986).

The exact curative value of lymphadenectomy in surgical treatment of cancer of the ovary is not yet defined; in some series 5 year survival improved by 20%.

	Survival Rate
Stage II positive node	30%
Stage IV positive node	No survival

To obtain best result, there should not be left any residue or maximum 2 cm residual tissue may be left back.

Second look laparotomy should be carried out after 6 to 8 courses of chemotherapy — to evaluate overall response. It is preferably carried out in Stages III and IV with the idea of cytoreduction from macroscopic to microscopic disease.

	5-year survival rate
Microscopic disease found	50%
Macroscopic disease found	30 — 40%

Even after 2 decades, it remains a controversy if second look laparotomy is really justified.

Endometrial Carcinoma:

Previously it was believed that in early ca. endometrium (Stage I) pelvic lymphnodes are hardly involved. Accordingly the choice of treatment was total abdominal hysterectomy with bilateral salpingo-oophorectomy (TAH & BSO) or along with that removal of a little vaginal cuff (Extended Hysterectomy). The result of such treatment reviewed by different authors is given below:

	Treatment	**Five Year Survival Rate**	
Author	TAH + BSO	Extended Hysterectomy	Radical Surgery
Bourne et al (1955)	70%	Extended hysterectomy better in reducing	
Corscaden & Tovell (1954)	64%	incidence of vault recurrence.	
Gusberg et al (1960)	66%		
Hawksworth (1959)	68%		
Robert (1961)	72% -	vault recurrence : 8%	Radical Surgery
Schlink (1957)	70%		better than Extended hysterectomy

The incidence of lymphnode metastasis in ca. endometrium is as follows:

Pelvic lymphnodes	10%
Paraaortic lymphnodes	15%

Recurrence rate according to lymphnode metastasis is:

	Recurrence Rate	
	Negative	Positive
Pelvic nodes	10%	58%
Paraaortic nodes	10%	59%

According to GOG why then Radical Surgery should not be done for ca. endometrium. Early endometrial carcinoma should no more be treated by TAH + BSO or extended hysterectomy with removal of vaginal cuff (Orr et al, 1991).

Radical hysterectomy with pelvic lymphadenectomy is justified with 5-year survival rate being as high as 80%. Even if there is additional risk due to obesity, hypertension, diabetes associated with the disease and increased operative time, blood loss and wound infection, it is worth doing Radical Hysterectomy — preferably by vaginal route.

Stage II — Endocervical involvement in ca. endometrium being 10 to 15%, it is worth doing Radical Hysterectomy with pelvic lymphadenectomy. Vaginal radical surgery here also has got better result than Abdominal Radical Hysterectomy. Five year survival rate in such treatment is better than that with extended hysterectomy — 75% and 65% respectively.

Stage III & IV

Combined treatment with irradiation and surgery give better result.

	5-Year survival rate
Microscopic involvement of adnexa	70%
Gross involvement of adnexa or pelvis (Burkman et al, 1982)	15%

When bladder and rectum are involved exenteration operation may be thought of but 5-year survival is poor — only 7% (Vikho et al, 1984).

Ca. Vulva

Nearly 27.5% cases have a close relative suffering from genital and extragenital malignancy in post menopausal women (Way, 1982). Traditionally according to Way (1948, 1960, 1973) radical vulvectomy with bilateral inguinofemoral lymphadenectomy with or without pelvic lymphadenectomy is the treatment of choice for stage I & II. But the scope of individualization of treatment has been emphasised by Monaghan and Shepherd (1990).

About 40 years back, 5-year survival rate in ca. vulva was only 15% and operative mortality was as high as 10-12%. Significant improvement has been made in survival rate in the past few years due to early diagnosis and modified radical vulvectomy with selective lymphadenectomy:

Factors influencing the choice of treatment are:

- Medical condition of the patient — advanced age, obesity, diabetes, hypertension.
- Staging and TNM classification
- Size of the tumour — bigger the tumour, the greater the risk of metastasis: > 4 cm.
- Site of the Tumour: Labia, Clitoris
- Laterally involving urethra, vagina/perineum — treatment should be more aggressive (Parry zones, 1983)
- Groin node status — 30-40 cases involved.

Treatment plan for Ca. vulva carried out during recent years is as follows:

Stage		Treatment
Stage I	(T1 Tumour with < 1 mm stromal invasion)	Radical Local excision. No groin node dissection (GND)
Stage II	(T1 Tumour with > 1 mm stromal invasion)	
	A) Lateral lesions	Radical local excision + unilateral GND
	B) Midline lesions	Radical Vulvectomy + BGND
	C) Perineal lesions	Radical local excision + BGND
Stage II	(T2 Tumours $\leq$ 4 cm)	Radical vulvectomy + BGND through separate incisions or butterfly incision. Selected cases: Radical local excision and BGND
Stage II	(T2 Tumours > 4 cm)	Radical Vulvectomy + BGND +
Stage III		Bilateral pelvic node dissection (or radiation)
Stage IV	(selected cases)	Anterior Exenteration.

Life tables for 261 patients of vulval cancer treated by Monaghan (1990) is as follows:

No. of Cases	Lymphnode status	5-year survival
261	All patients	72.7%
85	Radical vulvectomy + GND	Negative nodes — 94.3%
39	``	Positive nodes — 62.3%
24	`` + pelvic node dissection	Positive nodes — 21.1%

The following Table shows 5-year survival by Clinical staging (Cavanagh et al, 1990).

Stage	No. of Patients	5-Year survival (%)
I	88	76 (86%)
II	59	37 (63%)
III	42	19 (45%)
IV	14	5 (36%)
Total	203	137 (67%)

Conclusion:

Throughout 20th century there has been considerable progress in radical surgery for primary treatment for gynaecological malignancies. It is now clear from recent publications that due to increased consciousness of the community and improved diagnostic facilities more cases are being detected in earlier stages making them suitable for radical surgery. The general consensus among gynaecological oncologists is that the

first form of treatment should be radical surgery since the recurrence depends on the completeness and the extent of the original operation. Surgery offers the best hope of cure of over 80% to cases with earlier lesions.

Although radiotherapy and chemotherapy are also other modalities of treatment of gynaecological malignancies, none of those is considered to have any effective role as a primary mode of treatment. The question of using radiotherapy instead of pelvic node dissection is controversial as reported by a Gynaecologic Oncology Group Study (1991).

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