The Role of Radiotherapy in Localized Recurrent Ovarian Cancer: A Retrospective Cohort Analysis and Review of the Literature

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ABSTRACT

Background: Radiotherapy has a limited but re-emerging role in the management of recurrent epithelial ovarian cancer. We reviewed the published evidence and analysed our own institutional cohort of patients treated with radiotherapy for locoregionally recurrent disease after failure of systemic treatment.

Methods: A retrospective audit of patients treated with radiotherapy for recurrent ovarian cancer at our institution (1997–2015) was analysed. Kaplan–Meier methodology was used to estimate disease-free survival (DFS) and overall survival (OS) after radiotherapy in the 41 evaluable patients, after excluding 18 cases that did not meet eligibility criteria.

Results: Median DFS after radiotherapy was 8.5 months (95% CI, lower bound 5.5 months; upper bound not reached). Median OS measured from the start of radiotherapy was 28.3 months (95% CI 13.4–43.2 months), with actuarial 1-, 2- and 3-year OS of 82%, 57% and 40% respectively. Radiotherapy doses of 40–55 Gy (predominantly 45 Gy in 20–25 fractions) were used, consistent with contemporary involved-field radiotherapy practice.

Conclusion: In carefully selected patients with locoregionally recurrent ovarian cancer, radiotherapy can produce meaningful disease-free intervals and encouraging survival outcomes, consistent with the wider published literature. Patient selection — by resectability, performance status, and response to systemic therapy — remains the key determinant of benefit.

Keywords: ovarian cancer; recurrence; radiotherapy; involved-field radiotherapy; disease-free survival; overall survival

INTRODUCTION

Epithelial ovarian cancer remains the most lethal gynaecological malignancy in high-income countries, largely because most patients present with advanced-stage disease and the majority who achieve remission after primary surgery and platinum/taxane-based chemotherapy will eventually relapse. Recurrence after first-line treatment is common, and the pattern of relapse varies: many patients develop diffuse peritoneal carcinomatosis, but a meaningful subset present with locoregionally confined recurrence — isolated pelvic, nodal, or extranodal disease without evidence of widespread peritoneal or distant spread.

Historically, radiotherapy occupied a defined role in ovarian cancer management, including whole-abdominal irradiation in the pre-platinum era. As systemic platinum-based chemotherapy became the established standard following the randomised trials of the 1990s, radiotherapy was progressively relegated to a palliative role, used mainly for symptom control of bleeding, pain, or mass effect. However, epithelial ovarian cancer is a radiosensitive tumour, and the growing recognition of an oligometastatic or oligorecurrent disease state — in

which a limited volume of macroscopic recurrence can be treated with local ablative therapy while systemic disease remains controlled — has prompted renewed interest in radiotherapy as a potentially curative or durably disease-controlling option for selected patients with locoregionally recurrent disease.

This is particularly relevant for patients who have exhausted or are unsuitable for further lines of chemotherapy, who have isolated nodal or pelvic recurrence amenable to a defined radiotherapy volume, or in whom repeat cytoreductive surgery is not feasible. Modern radiotherapy techniques — three-dimensional conformal radiotherapy (3D-CRT), intensity-modulated radiotherapy (IMRT), and stereotactic body radiotherapy (SBRT) — allow dose escalation to the target volume while sparing adjacent bowel, bladder, and other organs at risk, improving the therapeutic ratio compared with older techniques.

The purpose of this paper is twofold: first, to review the available published evidence on the effectiveness of radiotherapy in localized recurrent ovarian cancer; and second, to present a retrospective institutional analysis of disease-free and overall survival outcomes in patients treated with radiotherapy for locoregionally recurrent ovarian cancer at our institution, building on our previously reported abstract data.

LITERATURE REVIEW

Historical context

Prior to the widespread adoption of platinum-based chemotherapy, whole-abdominal radiotherapy (WAR) was used as adjuvant treatment for ovarian cancer, and early series suggested a survival benefit in patients who had undergone optimal cytoreductive surgery. As systemic chemotherapy regimens improved and demonstrated superior outcomes with more favourable toxicity profiles, WAR was largely abandoned as adjuvant therapy, and radiotherapy's role contracted to symptom palliation in the recurrent setting for much of the 1990s and 2000s.

Rationale for radiotherapy in recurrent disease

Interest in definitive-intent radiotherapy for recurrent ovarian cancer re-emerged from single-institution retrospective series demonstrating that involved-field radiotherapy (IFRT) — radiotherapy targeted specifically to the volume of macroscopic recurrence with a margin, rather than the whole abdomen or pelvis — could achieve durable local control. The landmark retrospective series from the University of Texas MD Anderson Cancer Center reviewed 102 patients treated with definitive IFRT (≥45 Gy) for locoregionally recurrent disease. Radiotherapy was directed at localized nodal (49%) or extranodal (51%) recurrences, delivered after a median of three courses of chemotherapy. The authors reported a 5-year in-field control rate of 71%, with a substantial minority of patients rendered free of disease at extended follow-up; clear-cell histology and platinum-sensitive disease were independently associated with better overall survival. This series established involved-field radiotherapy as a rational tool in the curative-intent management of selected patients with locoregionally recurrent ovarian cancer, rather than a purely palliative measure.

Subsequent retrospective series, including tumour-volume-directed IFRT cohorts and IMRT-based series in chemotherapy-refractory recurrence, reinforced these findings, generally reporting favourable local control with acceptable toxicity, albeit in heterogeneous, selected patient populations.

Retrospective institutional experiences

A more recent Korean series using 3D-CRT and IMRT in 43 patients treated for recurrent ovarian cancer at 58 tumour sites reported 1-, 2- and 3-year overall survival rates of 82.4%, 68.4% and 57.9%, with local control rates of 100%, 100% and 80% at the same time points, and disease-free survival rates of 79.7%, 56.7% and 46.8%. The authors highlighted that radiotherapy appeared to improve survival compared with historical figures of less than 20% at 5 years for recurrent ovarian cancer managed without local therapy, although they acknowledged the absence of large-scale randomised data. A separate updated Korean cohort study similarly found higher overall survival among patients treated with involved-field radiotherapy compared with those managed without radiotherapy, across both favourable and unfavourable prognostic subgroups. Histology-specific data,

particularly for clear-cell carcinoma — a subtype recognised for relative chemoresistance but radiosensitivity — have also suggested a particular benefit from pelvic radiotherapy in patterns-of-recurrence analyses.

Study	Year	n	Design / RT	Key outcome
Brown et al. (MD Anderson)	2013	102	Retrospective; IFRT ≥45 Gy	5-year in-field control 71%; clear-cell histology and platinum-sensitive disease associated with better survival
Albuquerque et al.	2005 / 2016	–	Retrospective; tumour-volume-directed IFRT	Durable local control and disease-free intervals with long-term follow-up
Chundury et al.	2016	–	Retrospective; IMRT	Good local control and limited toxicity in chemo-refractory recurrence
Chang et al. (KROG 14-05)	2018	30	Prospective phase II; IFRT ≥45 Gy	First prospective evidence: IFRT safe and effective for recurrent disease
Lee/Kim et al.	2024	–	Retrospective, updated Korean cohort	Radiotherapy associated with higher overall survival vs. no radiotherapy in both favourable and unfavourable subgroups
Zhang et al.	2020	43	Retrospective; 3D-CRT / IMRT	1-/2-/3-year OS 82%/68%/58%; local control 100%/100%/80%
Macrie et al.	2014	–	Retrospective; clear-cell histology	Pelvic radiotherapy associated with improved local control in clear-cell recurrence
SBRT oligometastatic OC (meta-analysis)	2025	Pooled	Systematic review / meta-analysis	SBRT well tolerated with favourable local control across included series
SABR-ROC (KGOG 3064 / KROG 2204)	Ongoing	–	Prospective phase III (randomised)	Standard of care ± stereotactic ablative RT; overall survival endpoint; result pending
Present series (our institution)	2026 (this report)	41	Retrospective; IFRT 40–55 Gy	Median DFS 8.5 months; median OS 28.3 months from RT

Table 1. Summary of key published series evaluating radiotherapy in recurrent ovarian cancer, in relation to the present cohort. OC = ovarian cancer; IFRT = involved-field radiotherapy; SBRT = stereotactic body radiotherapy; OS = overall survival; DFS = disease-free survival.

Prospective evidence

Most published evidence in this field derives from small, retrospective, single-institution series, with inherent selection bias, since only patients with favourable performance status, limited-volume disease, and response to prior systemic therapy are typically offered radiotherapy after multidisciplinary discussion. The Korean Radiation Oncology Group trial (KROG 14-05) represents the first prospective phase II evaluation of involved-field radiotherapy in this setting, enrolling 30 patients and reporting that the approach was both safe and effective, providing the strongest level of evidence available to date. Building on this, a prospective multi-institutional phase III trial (SABR-ROC, KGOG 3064/KROG 2204) is now underway, randomising patients with recurrent ovarian cancer to standard-of-care systemic therapy with or without stereotactic ablative radiotherapy, with overall survival as a key endpoint; results are awaited and will represent the first randomised evidence in this space.

Modern techniques: SBRT and the oligometastatic paradigm

The concept of oligometastatic or oligorecurrent disease — a limited number of detectable recurrence sites potentially amenable to ablative local therapy — has informed a shift toward stereotactic body radiotherapy (SBRT) in selected patients with oligometastatic ovarian cancer. A recent systematic review and meta-analysis of SBRT in this population found the technique to be generally well tolerated, with favourable local control reported consistently across the included series, supporting its use as a local ablative option, particularly for patients unsuitable for further surgery or systemic therapy escalation.

Palliative radiotherapy

Even outside the definitive-intent setting, radiotherapy retains an important palliative role in ovarian cancer for symptom control. A systematic review of palliative pelvic radiotherapy across gynaecological cancers, including ovarian cancer, found encouraging rates of symptom palliation, with haemorrhage control achieved in around 55% of cases and pain control in around 70%, although the underlying evidence base was heterogeneous, mostly retrospective, and lacked standardised outcome reporting.

Taken together, the literature supports a re-evaluation of radiotherapy's role in recurrent ovarian cancer: no longer purely palliative, but a legitimate local ablative option for carefully selected patients with locoregionally confined, radiographically limited recurrence, ideally discussed within a multidisciplinary team framework alongside surgery and systemic therapy.

METHODS

We performed a retrospective single-centre audit of patients treated with radiotherapy for recurrent epithelial ovarian cancer at our institution, a regional cancer centre, spanning treatments delivered between 1997 and 2015. Cases were identified from an electronic radiotherapy database and cross-referenced with case notes and the electronic chemotherapy prescribing system. Disease stage at initial diagnosis was recorded according to the FIGO staging system in use at the time of diagnosis.

Patients were selected for radiotherapy after multidisciplinary team discussion; factors considered included response to prior treatment lines, resectability of the recurrence, performance status, and the availability and suitability of other treatment modalities. Eligible patients for the survival analysis were those who received radiotherapy with locoregional/pelvic intent directed at recurrent disease, having completed the planned course. Patients were excluded where radiotherapy had been part of first-line (primary) treatment rather than for recurrence, where the treated field did not include pelvic or locoregional disease (e.g., palliative cranial irradiation), where the radiotherapy course was incomplete, where a patient received radiotherapy on two separate occasions such that a single course could not be isolated for analysis, or where documentation was insufficient or internally inconsistent.

Disease-free survival (DFS) was defined as the time from completion of radiotherapy to the next documented relapse, and overall survival (OS) as the time from the start of radiotherapy to death from any cause, with patients alive at last follow-up censored at that date. Kaplan–Meier methodology was used to estimate DFS and OS, with medians and two-sided 95% confidence intervals calculated using the Brookmeyer–Crowley method. Analyses were performed in Python (lifelines library, version 0.30).

RESULTS

Patient selection

The institutional radiotherapy audit dataset comprised 59 treatment episodes for ovarian and closely related gynaecological malignancies. After applying the eligibility criteria described above, 18 episodes were excluded (Table 2) and 41 patients with locoregionally recurrent ovarian cancer treated with radiotherapy of curative or disease-controlling intent were included in the survival analysis. This is consistent with the cohort of 41 evaluable patients previously reported in abstract form from an original series of 51 patients screened at this centre.

Reason for exclusion	n
Radiotherapy delivered as part of first-line (primary) treatment rather than for recurrence	10
No pelvic/locoregional field irradiated (e.g., cranial or axillary radiotherapy)	2
Radiotherapy given on two separate occasions (course could not be isolated)	2
Insufficient documented data to confirm eligibility	2
Inconsistent or contradictory case-note data	1
Radiotherapy course not completed	1
Total excluded	**18**

Table 2. Reasons for exclusion from the survival analysis (n = 18).

Baseline characteristics

Histology was heterogeneous, reflecting the range of epithelial and non-epithelial ovarian malignancies referred for radiotherapy, with high-grade serous, clear-cell, endometrioid and mucinous subtypes each represented. FIGO stage at initial diagnosis was distributed across early- and advanced-stage disease, with stage recorded as unknown or not clearly documented in a substantial minority of the historical case notes, a recognised limitation of retrospective audits spanning almost two decades. All patients had received at least one line of platinum-based chemotherapy, with a median of two lines of systemic treatment prior to radiotherapy. By the audit census date, 24 of 41 patients (58.5%) had died and 17 (41.5%) remained alive.

Characteristic	n	%
Total evaluable patients	41	100
FIGO stage at initial diagnosis		
I	13	31.7
II	9	22.0
III	5	12.2
IV	1	2.4
Unknown / not recorded	13	31.7
Histology		
Clear cell	6	14.6
High-grade serous	9	22.0
Mucinous	3	7.3
Endometrioid	6	14.6
Other / mixed (incl. carcinosarcoma, sarcoma, squamous, granulosa cell)	10	24.4
Unknown	5	12.2
Vital status at last follow-up		
Dead	24	58.5
Alive	17	41.5

Table 3. Baseline and disease characteristics of the 41 evaluable patients.

Radiotherapy treatment characteristics

Radiotherapy was delivered with locoregional/involved-field intent, most commonly to a total dose of 45 Gy in 20–25 fractions, with a dose range of 40–55 Gy across the cohort reflecting evolving practice and individualised target volumes over the audit period. A subset of patients received a brachytherapy boost in addition to external-beam treatment, documented in the case-note comments as "selectron" or high-dose-rate brachytherapy insertion, consistent with contemporary practice for pelvic or vault recurrences.

Treatment parameter	Value
Total radiotherapy dose	Predominantly 45 Gy (25/41 patients); range 40–55 Gy
Fractionation	20–28 fractions (conventional, 1.8–2.0 Gy/fraction)
Lines of chemotherapy before radiotherapy	Median 2 (range 1–4); all patients platinum-pretreated
Radiotherapy intent	Locoregional/involved-field, delivered after multidisciplinary team selection
Brachytherapy boost (selectron/HDR)	Used in a subset of patients (documented in case notes)

Table 4. Radiotherapy and systemic treatment characteristics.

Disease-free survival

At the time of analysis, 24 of 41 patients (58.5%) had experienced a further relapse event. The Kaplan–Meier estimated median disease-free survival after radiotherapy was 8.5 months (95% CI: lower bound 5.5 months; the upper bound could not be estimated because fewer than half of the longest-surviving, disease-free patients had relapsed by the end of follow-up). Approximately half of patients remained disease-free at 6–8.5 months, with a subgroup of long-term disease-free survivors extending well beyond 24 months, indicating a wide spread of outcomes consistent with a heterogeneous, selected population.

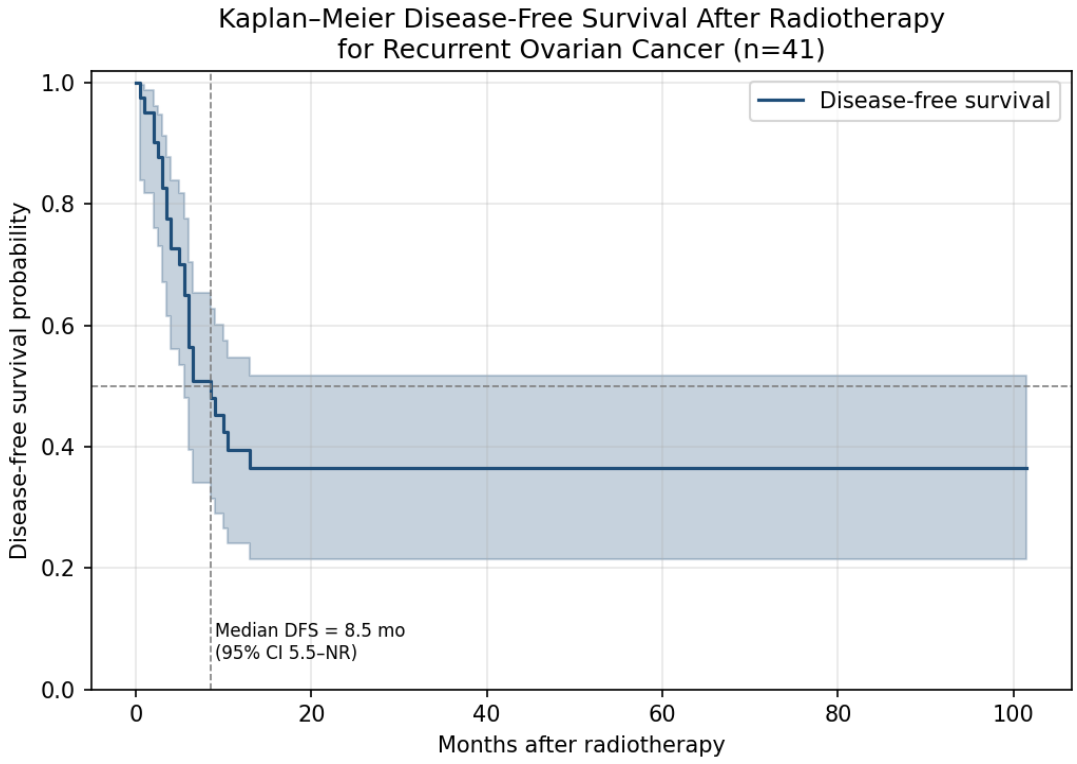

Figure 1. Kaplan–Meier disease-free survival curve after radiotherapy for recurrent ovarian cancer (n = 41). Shaded area represents the 95% confidence interval.

Overall survival

Measured from the start of radiotherapy, the Kaplan–Meier estimated median overall survival was 28.3 months (95% CI 13.4–43.2 months). Actuarial overall survival was 82% at 1 year, 57% at 2 years, 40% at 3 years, and 26% at 5 years. These figures are broadly consistent with, and in some respects more favourable than, historical benchmarks for recurrent ovarian cancer managed without locoregional radiotherapy, and are comparable to contemporary published radiotherapy series, supporting the durability of benefit seen with locoregional radiotherapy in appropriately selected patients.

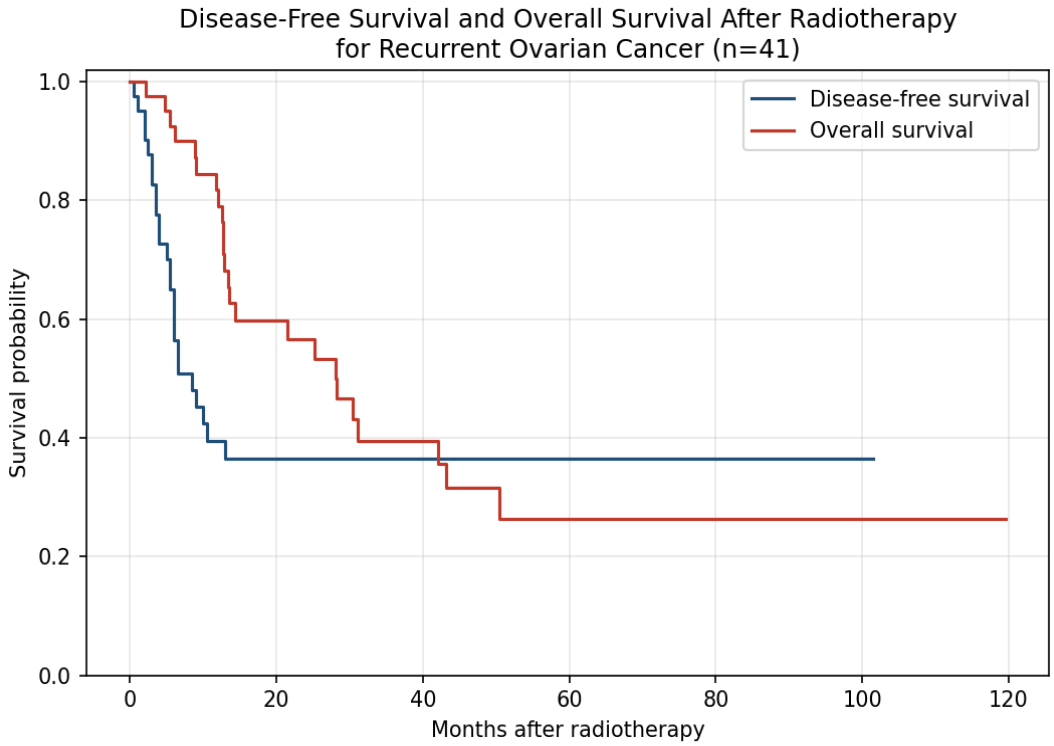

Figure 2. Kaplan–Meier disease-free survival (blue) and overall survival (red) curves after radiotherapy for recurrent ovarian cancer (n = 41).

DISCUSSION

Our institutional experience, spanning nearly two decades of practice, adds to a growing body of retrospective evidence that radiotherapy can produce meaningful disease-free intervals and encouraging survival outcomes in carefully selected patients with locoregionally recurrent ovarian cancer. A median disease-free survival of 8.5 months and median overall survival exceeding two years from the start of radiotherapy compare favourably with the natural history of recurrent ovarian cancer managed with systemic therapy alone, and are consistent with the outcomes reported by other single-institution and multi-institutional series, including the MD Anderson experience and more recent Korean cohorts using 3D-CRT and IMRT.

Several factors likely underpin these outcomes and merit discussion. First, patient selection is central: as in the comparator series, patients in our cohort were selected for radiotherapy by multidisciplinary discussion on the basis of resectability, performance status, and response to prior treatment, meaning our results describe outcomes in a favourably selected population rather than an unselected recurrent ovarian cancer population, and should not be interpreted as evidence that radiotherapy would benefit all patients with recurrence. Second, the heterogeneity of histology in our cohort, including a meaningful proportion of clear-cell and endometrioid subtypes, is relevant given published data suggesting differential radiosensitivity and prognosis by histological subtype; clear-cell carcinoma in particular has been reported to respond favourably to radiotherapy despite relative chemoresistance. Third, radiotherapy doses in our series (predominantly 45 Gy in 20–25 fractions) are consistent with contemporary involved-field radiotherapy thresholds associated with durable local control in the literature (typically ≥45 Gy).

The exclusion of 18 of 59 audited episodes, most commonly because radiotherapy had in fact been delivered as part of first-line rather than recurrent-disease treatment, illustrates an important methodological point for anyone auditing or pooling such datasets: administrative or database-level identification of "recurrent-setting" radiotherapy requires careful case-note verification, since coding alone is an unreliable guide to clinical intent.

Our findings should be interpreted in the context of several limitations. This is a retrospective, single-centre analysis without a contemporaneous comparator group of similar patients managed without radiotherapy, so causal claims about radiotherapy's independent contribution to survival cannot be made; the observed outcomes may partly reflect favourable underlying prognosis in the selected patients rather than a direct treatment effect. The audit spans almost two decades (1997–2015), during which radiotherapy planning and delivery techniques, systemic therapy options (including the introduction of bevacizumab and, later, PARP inhibitors), and imaging-based staging all evolved substantially, introducing heterogeneity that limits direct comparison across the cohort. Documentation gaps, particularly for FIGO stage and radiotherapy dose in a minority of older cases, reflect the practical realities of long-interval retrospective case-note review. Sample size (n = 41) is modest, precluding robust subgroup or multivariable analysis of prognostic factors such as histology, platinum sensitivity, or time to recurrence, all of which have been shown to influence outcome in larger series.

These limitations mirror those of the wider published literature, which remains dominated by small, retrospective, single-institution series subject to similar selection biases. The completion of the KROG 14-05 phase II trial represented an important step toward prospective evidence, and the ongoing SABR-ROC phase III randomised trial should, when reported, provide the first randomised data on whether adding stereotactic ablative radiotherapy to standard systemic therapy improves overall survival in recurrent ovarian cancer — a result that would meaningfully change the strength of evidence underpinning this practice. Until such data mature, our findings, alongside the wider literature summarised in this review, support the continued use of radiotherapy as one tool within a multidisciplinary treatment strategy for selected patients with locoregionally recurrent ovarian cancer, rather than a routine or default intervention.

CONCLUSION

Radiotherapy, when directed to the involved field in carefully selected patients with locoregionally recurrent ovarian cancer, can achieve clinically meaningful disease-free intervals and overall survival, with outcomes in our institutional cohort (median DFS 8.5 months; median OS 28.3 months) consistent with the wider published literature. Patient selection through multidisciplinary discussion — incorporating resectability, performance status, histology, and response to prior systemic therapy — remains the key determinant of benefit. Radiotherapy should be considered a legitimate component of the curative-intent and disease-control armamentarium for locoregionally recurrent ovarian cancer, alongside surgery and systemic therapy, rather than reserved solely for palliation. Prospective randomised evidence, expected from the ongoing SABR-ROC trial, is needed to define its role more precisely and should guide future practice recommendations.

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