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SYSTEMATIC LYMPHADENECTOMY VERSUS SENTINEL LYMPH NODE MAPPING IN ENDOMETRIAL CANCER: A NARRATIVE REVIEW OF CURRENT EVIDENCE, OUTCOMES AND GUIDELINES

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ABSTRACT: Endometrial cancer (EC) incidence is rising worldwide, increasing the need for accurate lymph node assessment. Recent advances have shifted surgical staging from systematic lymphadenectomy to sentinel lymph node (SLN) mapping, which aims to preserve oncologic safety while reducing morbidity. This narrative review summarizes evidence from 2018–2025 showing that lymphadenectomy offers no survival benefit and leads to higher rates of lymphedema and lymphoceles. SLN mapping provides high diagnostic accuracy and fewer complications, with comparable survival outcomes. Remaining challenges include lower mapping success in obesity and limited access to minimally invasive technology in Brazil, underscoring the need for expanded training and infrastructure.

Key words: Endometrial cancer; sentinel lymph node; lymphadenectomy; morbidity; survival; quality of life.

Introduction

The incidence of endometrial cancer (EC) has been rising worldwide, especially in high-income countries. In 2019, an estimated 435,041 new cases and 91,641 deaths were reported globally, underscoring its growing public health relevance [1].

In Brazil, with a population exceeding 200 million, the burden is also increasing. According to the INCA's *Estimativa 2023*, the annual number of new cases of corpus uteri cancer (which includes EC) is estimated at 7,840 cases (age-standardized rate: 7.1 per 100,000 women) for each year between 2023 and 2025 [2]. This growth is largely driven by the rising prevalence of obesity in the ageing female population, as about 24.8% of Brazilian women aged 18 years or older are obese and more than half are overweight. [3]. In line with these projections, Paulino et al. (2018) estimated that EC cases will rise from 9,372 in 2025 to nearly 12,000 by 2035, underscoring the urgent need to strengthen early detection and staging strategies in Brazil [4].

EC incidence in the United States rose from 24.0 to 30.6 cases per 100,000 women between 2000 and 2019. The highest increases occurred among younger women (<50 years) and racial and ethnic minorities – especially Black, Hispanic, and Asian/Pacific Islander women – with annual rises of 2–3%, compared with about 1% in non-Hispanic White women [5]. Aggressive, non-endometrioid tumors are more common in Black women, whose mortality rate is nearly double compared to White women [5]. Analyses using the Cancer in North America registry (1995–2018) also showed that early-onset EC (<50 years) has been increasing more rapidly among non-White women, possibly linked to rising obesity in younger generations [6]. In Brazil, between 2000 and 2021, EC caused 72,189 deaths, with higher and faster-declining mortality rates among White women than Black women. These racial disparities likely reflect social and economic inequalities [7].

Recent evidence has shown an accelerated paradigm shift from systematic lymphadenectomy – which involves the removal of multiple pelvic and, when indicated, para-aortic lymph nodes to assess nodal status – to sentinel lymph node (SLN) mapping in EC. The FIRES trial demonstrated that SLN mapping using indocyanine green (ICG) provides high diagnostic accuracy, with a sensitivity of 97.2% and a negative predictive value (NPV) of 99.6%, supporting SLN as a reliable staging technique [8].

National data also show rapid adoption: SLN use increased from 0.7% to 39.6% in the United States from 2012 to 2020, reflecting a true change in clinical practice with an Average Annual Percent Change (AAPC) of ~52% [9].

Contemporary multicenter cohorts applying the SLN algorithm report similar nodal metastasis detection and no differences in survival outcomes compared with systematic lymphadenectomy in patients with locally advanced EC [10]. Importantly, morbidity is significantly lower; a 2025 Cochrane review found that SLN reduces lymphedema by approximately 70% (RR ~0.30), reinforcing the benefit of a less radical approach [11]. In line with this evidence, the ESGO/ESTRO/ESP 2023–2025 guidelines endorse SLN mapping – with ultra staging and side-specific lymphadenectomy when mapping fails – as the preferred staging method for disease confined to the uterus [12].

In Brazil, the adoption of SLN mapping remains limited to selected reference centers, mainly due to disparities in surgical infrastructure, limited access to minimally invasive technology, and lack of standardized training. The Brazilian Society of Surgical Oncology (BSSO) acknowledges SLN as a promising alternative but emphasize the need for broader implementation capacity and validation in the public health system [13].

This non-systematic narrative review summarizes recent evidence comparing systematic lymphadenectomy and SLN mapping in EC, focusing on survival outcomes, complications, quality of life, and current recommendations.

Research questions

We used three key questions to conduct the review in the literature on the use of SNL mapping in EC:

Does SLN mapping provide oncologic outcomes (survival and recurrence) comparable to systematic lymphadenectomy in endometrial cancer?

Does SLN mapping reduce surgical morbidity and improve quality of life compared with systematic lymphadenectomy?

What are the current barriers and limitations to the adoption of SLN mapping in Brazil?

Methodology

This study is a narrative, non-systematic review designed to summarize current evidence comparing systematic lymphadenectomy and SLN mapping in EC, including outcomes, complications, quality of life, and implementation issues in Brazil.

Search Strategy

The literature search was performed in PubMed/MEDLINE, Scopus, Embase, SciELO, and Web of Science, as well as in major international guidelines (NCCN, FIGO, SGO, INCA, and BSSO). Because narrative reviews allow a broader and more flexible approach, the search strategy focused on identifying the most relevant and influential studies rather than adhering to the structured protocol required for systematic reviews. A comprehensive search of PubMed and SciELO was performed using combinations of terms related to endometrial cancer, systematic lymphadenectomy, sentinel lymph node mapping, indocyani-

ne green, ultrastaging, survival, recurrence, morbidity, lymphedema, quality of life, and healthcare disparities. Additional references were identified manually from the bibliographies of key articles.

Inclusion Criteria

Included studies comprised randomized clinical trials evaluating lymphadenectomy or SLN mapping in endometrial cancer; prospective and retrospective observational studies reporting diagnostic accuracy, survival, recurrence, complications, or quality-of-life outcomes; population-based analyses such as SEER, or national registries; systematic reviews and meta-analyses published within the last ten years; updated clinical guidelines from 2018 to 2025; and Brazilian studies addressing the implementation, feasibility, or structural barriers related to SLN mapping.

Exclusion Criteria

Excluded studies were those with fewer than 20 participants without methodological justification, studies focused exclusively on non-endometrial tumors, case reports or very small case series lacking clinically meaningful data, and investigations limited to exploratory imaging techniques without assessment of clinical outcomes.

Results

Clinical Importance of Lymph Node Assessment in Endometrial Cancer

Staging based solely on myometrial or serosal invasion has important limitations. Although deeper invasion increases the probability of nodal spread, it is not sufficiently accurate to predict lymph node metastasis on its own. In a study of 368 women with endometrioid EC, 22.6% of patients with deep myometrial invasion presented lymph node metastasis, meaning over 75% of these patients would undergo unnecessary lymphadenectomy. Even combining high-risk uterine factors (tumor >2 cm, deep invasion, grade 3), lymph node involvement was only 30% [14].

Given these limitations, staging based solely on uterine parameters reinforces the need for accurate lymph node assessment. The updated FIGO 2023 staging system integrates histological and molecular characteristics to more accurately define prognostic groups and guide treatment strategies. Lymph node involvement corresponds to stage III (specifically substage IIIC) and is strongly associated with higher recurrence risk and worse survival outcomes [15].

Clarke et al. (2022) [16] have documented a rising proportion of high-grade endometrial tumors, such as serous, clear cell, carcinosarcomas, and grade 3 endometrioid carcinomas. These aggressive histologies are well known to carry a substantially higher risk of nodal metastasis, underscoring that uterine factors alone are insufficient for accurate staging. Consistent with this evidence, the ESMO 2022 [17] and FIGO 2023 [15] guidelines recommend more precise nodal evaluation – through systematic lymphadenectomy or SLN mapping with ultra staging – to ensure adequate risk stratification.

Systematic Lymphadenectomy

Rational and Historic Role

Historically, systematic pelvic lymphadenectomy was incorporated into the surgical management of EC based on the biological rationale that the pelvic lymph nodes represent the primary site of extra-uterine dissemination in early-stage disease. Determining nodal status was therefore considered essential for accurate surgical staging and for guiding the need for adjuvant radiotherapy or chemotherapy [18]. This approach was further reinforced after the transition to surgical staging introduced by FIGO in 1988, which led to the widespread adoption of pelvic – and, in some centers, para-aortic – lymphadenectomy as part of standard surgical practice [19]. Over time, systematic lymphadenectomy became regarded as the 'gold standard' for staging, under the assumption that removing a greater number of lymph nodes would increase the detection of occult metastases, refine prognostic assessment, and potentially improve oncologic outcomes.

Evidence on Oncologic Outcomes

The two principal randomized trials evaluating the therapeutic impact of pelvic lymphadenectomy in early-stage endometrial cancer – the trial by Benedetti Panici et al., 2008 and the MRC ASTEC trial, 2009 – demonstrated that although systematic lymphadenectomy increases the accuracy of surgical staging, it does not provide a benefit in overall survival or disease-free survival [18, 20]. These findings indicate that the value of lymphadenectomy is primarily prognostic rather than therapeutic, suggesting that its routine use in all patients may not be necessary and should be reconsidered considering the associated morbidity and limited impact on long-term outcomes. Likewise, a recent large SEER population-based analysis of stage T1a, low-grade endometrioid carcinoma found no cancer-specific survival benefit from lymphadenectomy, supporting the limited therapeutic value of the procedure in early-stage, low-risk disease [21].

These trials have several recognized methodological limitations, including variation in how thoroughly lymph nodes were removed, differences in surgical technique, and the inclusion of a large proportion of low-risk patients who were unlikely to benefit from extensive nodal removal. Although these issues may have reduced the ability to detect therapeutic effect, both randomized trials consistently point in the same direction: systematic pelvic lymphadenectomy does not provide a meaningful survival benefit, and any advantage is likely minimal.

Studies have suggested that systematic lymphadenectomy may offer some benefit in selected higher-risk subgroups. A recent meta-analysis showed that adding para-aortic lymphadenectomy to pelvic dissection appears to improve 5-year overall survival in intermediate- and high-risk EC but does not reduce recurrence. Additionally, combined procedure increases postoperative complications and operative time. Further prospective studies are needed to clarify its clinical value [22]. These findings raise the possibility that nodal assessment could have therapeutic value in patients with a greater likelihood of occult metastases. However, because these studies are retrospective and inherently subject to selection bias, their conclusions must be interpreted with caution.

Overall, the available evidence indicates only a potential benefit in specific subgroups, without confirmation from randomized controlled trials. Importantly, the only ongoing randomized trial evaluating comprehensive pelvic and para-aortic lymphadenectomy in high-risk early-stage EC (ECLAT trial, NCT03438474) [23] is still in the recruitment phase, with results expected after 2031.

Morbidity and Limitations

Systematic lymphadenectomy also presents several practical limitations. In routine practice, the procedure is not always truly "systematic," with considerable variability in the extent of dissection and the number of lymph nodes removed [18, 20]. In low-risk patients, the yield is particularly low, leading many women to undergo a more aggressive operation despite a very small likelihood of nodal metastasis [24]. Moreover, conventional lymphadenectomy does not detect micrometastases or isolated tumor cells as effectively as SLN ultra staging, which can provide more detailed pathological assessment [25, 26]. Beyond the absence of a proven survival benefit, systematic lymphadenectomy is also associated with higher surgical morbidity, including longer operative times, increased blood loss, and both early and late complications such as lymphoceles and lower-limb lymphedema [18, 24].

These adverse effects have meaningful consequences for quality of life, especially in patients with a low probability of nodal involvement. In this context, the need for a less invasive but oncologically reliable staging approach has supported the development and widespread adoption of SLN mapping.

Sentinel lymph node (SNL) mapping

Concept and Surgical Technique

SNL mapping in EC is based on the principle that the first draining lymph node reflects the metastatic status of the entire lymphatic basin [25].The standard technique involves cervical injection of ICG at the 3 and 9 o'clock positions, followed by near-infrared imaging to visualize lymphatic drainage, which provides high and reproducible bilateral detection rates [8, 27]. Pathologic ultrastaging – employing step-sectioning and immunohistochemistry – further increases diagnostic accuracy by identifying micrometastases and isolated tumor cells [28]. To ensure oncologic safety, the NCCN and SGO recommend application of the SLN algorithm, in which failure to map a hemipelvis mandates side-specific lymphadenectomy [29,30,31].

Accuracy and Detection of Metastases

SLN mapping has demonstrated high diagnostic accuracy across multiple prospective and multicenter studies. In the FIRES trial, SLN biopsy achieved a sensitivity of 97.2% and a negative predictive value of 99.6%, correctly identifying 56 of 57 node-positive cases and yielding bilateral detection in 52% of patients [8]. The SENTI-ENDO study reported overall detection rates of 88% and bilateral mapping in 62%, and its long-term follow-up showed that SLN status effectively guided adjuvant treatment without compromising recurrence-free survival at 50 months [25, 32]. A meta-analysis also demonstrated that SLN

mapping detected higher proportion of low-volume metastases – up to 15% micrometastases and isolated tumor cells – due to ultrastaging protocols, thereby improving staging precision while maintaining oncologic safety [26].

Benefits and Current Challenges

Compared with systematic lymphadenectomy, SLN mapping markedly reduces surgical morbidity, with studies reporting significantly lower rates of lymphocele formation (1–3% vs. 10–20%) and lymphedema (2–5% vs. 15–40%), as well as fewer intraoperative and postoperative complications [33, 26]. In a large patient-reported outcomes study including 599 evaluable women, self-reported lower-extremity lymphedema occurred in 27% of patients who underwent SLN mapping compared with 41% following full lymphadenectomy (OR 1.85; 95% CI 1.25–2.74; p=0.002). Lymphedema was more common in patients who received external-beam radiotherapy (51% vs. 35%, OR 1.95; p=0.03) and in those with higher BMI. After adjusting for these factors, lymphadenectomy remained independently associated with an increased risk of lymphedema (OR 1.8; p=0.003), and affected patients reported significantly worse quality of life [33].

Its diagnostic performance has also been confirmed in intermediate- and high--risk EC: Cusimano et al. (2020) reported a sensitivity of 96% and a negative predictive value of 99%, while Persson et al. (2019) achieved 98% sensitivity, 99.5% NPV, and bilateral mapping rates of 95%, with no SLN-related complications. Despite these advantages, certain challenges persist, including unilateral mapping failure – which occurs in approximately 10–20% of cases, and SLN accuracy may be reduced in specific high-risk settings. A 2023 real-world study showed that tumors with lymphovascular space invasion (LVSI) had significantly lower NPV (75.0% vs. 95.6%; p=0.004), indicating that SLN mapping may be less reliable in LVSI-positive disease [36]. Additional challenges include the need for fluorescence imaging equipment, and dependence on surgical expertise [30, 29]. Nevertheless, current evidence strongly supports SLN mapping as an accurate, less invasive, and oncologically safe staging strategy when performed within standardized algorithms [29].

Comparative Evidence: SNL vs Systemic Lymphandectomy

Oncologic outcomes

Multiple studies demonstrate that SLN mapping provides oncologic outcomes equivalent to systematic lymphadenectomy across different risk groups. The FIRES prospective multicenter trial reported a sensitivity of 97.2% and a negative predictive value of 99.6% for nodal metastasis, supporting SLN mapping as an accurate staging strategy in clinically early-stage disease [8]. Similar findings were observed in a large SEER-based analysis of 11,014 women with stage T1a low-grade endometrioid cancer, where lymphadenectomy offered no cancer--specific survival advantage and was not an independent prognostic factor [21]. Additional evidence from intermediate- and high-intermediate–risk cohorts reinforce these results. In a multicenter Ukrainian study, recurrence-free survival did not differ between SLN biopsy and full lymphadenectomy, despite substantially lower complication ra-

tes in the SLN group [37]. High-risk populations show similar trends: SLN mapping demonstrated comparable disease-free and overall survival to lymphadenectomy in analyses by Capozzi et al. (2023), Cusimano et al. (2020), and Persson et al. (2019), with sensitivities of 96–98% and negative predictive values reaching 99–99.5%. This indicates that SLN mapping maintains staging accuracy and oncologic safety comparable to systematic lymphadenectomy.

Morbidity and Complications

SLN mapping significantly reduces surgical morbidity compared with systematic lymphadenectomy. Reported rates of lymphocele formation are markedly lower with SLN (1–3%) than with full nodal dissection (10–20%), and the incidence of lower-extremity lymphedema is similarly reduced (2–5% vs. 15–40%) [26]. In the Ukrainian multicenter cohort, postoperative complications within 30 and 90 days occurred in only 3.4% and 0.84% of SLN patients, respectively—substantially lower than in the lymphadenectomy group [37]. SLN mapping also avoids many intraoperative risks associated with extensive retroperitoneal dissection, including vascular injury and prolonged operative time.

Quality of life

SLN mapping significantly reduces surgical morbidity compared with systematic lymphadenectomy. Reported rates of lymphocele formation are markedly lower with SLN (1–3%) than with full nodal dissection (10–20%), and the incidence of lower-extremity lymphedema is similarly reduced (2–5% vs. 15–40%) [26]. In the Ukrainian multicenter cohort, postoperative complications within 30 and 90 days occurred in only 3.4% and 0.84% of SLN patients, respectively – substantially lower than in the lymphadenectomy group [37]. SLN mapping also avoids many intraoperative risks associated with extensive retroperitoneal dissection, including vascular injury and prolonged operative time. In patient-reported outcomes studies using validated lymphedema screening questionnaires, patients with lymphedema demonstrated significantly worse quality-of-life scores, underscoring the clinical impact of reducing lower-limb morbidity [33]. A summary of the findings is represented in Table 1. Thus, SLN demonstrates to provide safer surgical staging with a significantly lower complication burden.

Evidence gaps

Despite strong supportive evidence, several important knowledge gaps remain regarding the optimal use of SLN mapping. No completed randomized controlled trials directly comparing SLN mapping with systematic lymphadenectomy are currently available, with the only ongoing trial (ECLAT) still in recruitment [23]. Uncertainties persist in specific clinical scenarios: mapping failure is more common in patients with high BMI or morbid obesity [39, 40, 41] in cases of bulky lymph nodes or nodal involvement [40] and in high-risk histologies or deeply invasive tumors, where the data remain limited [42, 34]. Technical variability also remains a challenge: differences in surgeon experience, fluorescence imaging systems, and ultrastaging protocols may influence detection rates and reproducibility [30, 29]. Additionally, evidence is scarce regarding the role of SLN mapping in advanced-stage disease (FIGO III–IV)

Table 1. Key Differences Between Systematic Lymphadenectomy and SLN Mapping

Domain	*Systematic Lymphadenectomy*	*SLN Mapping*
Staging accuracy	Lower micrometastasis detection ↓ (Panici 2008; Ballester 2011)	High accuracy ↑↑; Sens. 96–98%, NPV ~99% (Rossi 2017; Persson 2019)
Therapeutic value	No OS/DFS benefit (Panici 2008; ASTEC 2009; Pei 2025)	Equivalent oncologic outcomes (Rossi 2017; Cusimano 2020; Capozzi 2023)
Complications	Lymphedema ↑↑ (15–40%); lymphoceles ↑ (10–20%) (Frost 2017; Leitao 2015)	Lymphedema ↓ (2–5%); lymphoceles ↓ (1–3%) (Bogani 2019; Leitao 2015)
Quality of life	Worse QoL ↓ due to chronic morbidity (Leitao 2015)	Improved QoL ↑; fewer symptoms (Leitao 2020)
Performance in high-risk EC	Low yield in low-risk disease ↓ (Frost 2017)	Accurate in intermediate/high-risk ↑ (Cusimano 2020; Persson 2019)
Technical limitations	High variability in node dissection (Panici 2008)	Mapping failure 10–20% ↑; ↓ performance in LVSI+, obesity (Buechi, 2023)

Subtitles: ↑= increase; ↓ decrease; **SLN** = Sentinel Lymph Node **ICG** = Indocyanine Green **OS** = Overall Survival **DFS** = Disease-Free Survival **NPV** = Negative Predictive Value; **QoL** = Quality of Life; **EC** = Endometrial Cancer; **LVSI** = Lymphovascular Space Invasion.

[27]. These gaps highlight the need for ongoing prospective studies and standardized methodologies to refine the role of SLN mapping in endometrial cancer management.

Adoption in Brazil: Opportunities and Barriers

In Brazil, the adoption of SLN mapping for EC remains largely restricted to a few high-volume reference centers, particularly in the private sector and philanthropic cancer hospitals. National data show that more than 70% of the population depends on the public health system (SUS), where access to minimally invasive surgery, fluorescence imaging, and robotic platforms is limited, and many gynecologic cancer surgeries are still performed by general gynecologists rather than formally trained gynecologic oncologists [4, 43].

Brazilian series from tertiary centers, such as the experience from AC Camargo Cancer Center and subsequent systematic reviews in RBGO, demonstrate that SLN mapping with ICG is feasible and oncologically safe in this setting, but they also highlight that implementation has been concentrated in specialized institutions with adequate infrastructure, rather than being broadly available across the SUS network [44, 45, 43].

Several structural barriers further limit widespread SLN adoption in Brazil, including insufficient access to ICG and near-infrared imaging, limited availability of laparoscopy and robotics in public hospitals, and a lack of standardized gynecologic oncology training. Surveys of Brazilian gynecologists show that training in gynecologic oncology is heterogeneous and often short, with no nationally recognized subspecialty track, which hampers dissemination of more complex techniques such as SLN mapping [46, 47]. As a result, SLN biopsy is more frequently offered in private or mixed institutions with better access to technology, while patients treated exclusively in the SUS are more likely to undergo traditional staging or no nodal assessment at all [43, 4].

This disparity creates both a challenge and an opportunity: expanding training in gynecologic oncology and prioritizing access to minimally invasive surgery and fluorescence-guided techniques in public reference centers could allow SLN mapping to be incorporated as a cost-effective, lower-morbidity staging strategy for Brazilian women with EC.

Discussion

The findings of this review reinforce the consistent evidence that systematic lymphadenectomy offers limited therapeutic benefit in early-stage EC, a conclusion also supported by multiple meta-analyses [48, 49]. These data highlight that uterine risk factors alone – such as depth of invasion or tumor diameter – lack sufficient accuracy to guide nodal management, especially in low-risk and T1a cohorts. In contrast, contemporary studies indicate that SLN mapping provides more precise staging with substantially reduced morbidity, aligning with broader international trends favoring individualized surgical staging based on tumor biology and patient risk profile [50]. This shift reflects a growing emphasis on balancing oncologic safety with quality-of-life outcomes [33].

Despite strong supportive evidence, several uncertainties persist. Mapping failure remains more common in patients with morbid obesity, deeply invasive tumors, or bulky lymph nodes, consistent with recent findings that tracer dose, adiposity, and nodal characteristics significantly affect mapping success [51, 40]. Technical variability – including differences in surgical expertise, imaging systems, and ultrastaging protocols – continues to limit reproducibility across institutions [8]. Furthermore, no completed randomized trial directly compares SLN with comprehensive lymphadenectomy; the ongoing ECLAT trial is expected to address this gap once results become available. Overall, while SLN mapping is an accurate and less morbid staging alternative, its optimal application will depend on improved access, standardized methodology, and more robust data in underrepresented subgroups.

Recent advances in molecular classification have reshaped nodal assessment in endometrial cancer. POLE-mutated tumors show a very low risk of nodal spread, while p53-abnormal and serous-like cancers have a substantially higher likelihood of metastasis even with limited myometrial invasion, underscoring the need for accurate nodal evaluation [52]. This molecular framework supports a more individualized staging approach and aligns with growing evidence that SLN mapping remains highly accurate across high-risk histologies.

Another important development relates to the detection of low-volume metastases through SLN ultrastaging. Meta-analyses show that SLN mapping identifies significantly more micrometastases and isolated tumor cells compared with conventional lymphadenectomy, raising ongoing discussion regarding their prognostic significance and the appropriate threshold for recommending adjuvant therapy [26]. While emerging data suggest that micrometastases may confer a higher recurrence risk, the impact of isolated tumor cells remains less clear, and treatment practices differ across guidelines. These evolving insights highlight how SLN mapping may offer superior staging granularity and help refine adjuvant treatment decisions, but also underscore the need for prospective studies to clarify the clinical implications of low-volume nodal disease.

Conclusion

This narrative review shows that systematic lymphadenectomy provides limited therapeutic benefit in early-stage EC and carries substantial morbidity, confirming its primarily prognostic purpose. SNL, in contrast, has proven to be a reliable and less invasive alternative, offering high diagnostic accuracy – especially when combined with ultrastaging – while significantly reducing complications such as lymphoceles and lymphedema. These advantages align with modern approaches emphasizing individualized treatment and preservation of quality of life.

However, challenges remain. Mapping failures are more common in patients with obesity, deeply invasive tumors, or bulky lymph nodes, and no randomized trials have yet directly compared SLN mapping to full lymphadenectomy. In Brazil, structural barriers – such as limited access to minimally invasive surgery, unequal distribution of fluorescence imaging technology, and heterogeneous surgical training – restrict broader adoption. Expanding SLN use will depend on improving surgical training, increasing technological availability, and implementing standardized SLN protocols across the public healthcare system to ensure equitable, accurate, and lower-morbidity staging for Brazilian women with EC.

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