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Fertility-sparing treatment options in cervical cancer – Review

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Abstract

Introduction and Objective. For a long time, radical surgery was the standard treatment for cervical cancer. In early-stage disease, hysterectomy with lymphadenectomy was commonly performed, which forever precluded any procreative plans. The increasing number of newly-diagnosed cervical cancer cases among women of reproductive age has led to the development of fertility-preserving treatments and minimally invasive techniques.

Review Methods. The review outlines fertility-sparing treatment options for patients of childbearing age diagnosed with cervical cancer. PubMed and Google Scholar (2016–2024) were searched using the terms: cervical cancer, fertility sparing treatment, fertility preservation, trachelectomy, radical trachelectomy, neoadjuvant chemotherapy, cervical cancer treatment, conization and simple trachelectomy from 5 March – 28 March 2025. Original papers, literature review, case reports, randomized clinical trials and meta-analysis were included. Manuscripts not written in English were excluded excluded.

Brief description of the state of knowledge. Depending on the stage of the cancer, options such as conization, trachelectomy, or neoadjuvant chemotherapy can help preserve fertility while avoiding radical procedures. The methods are evaluated for oncological outcomes, including metastasis and recurrence, and for reproductive outcomes, such as pregnancy.

Summary. The review presents current fertility-sparing surgical methods as well as chemotherapeutic approaches used to preserve fertility in women undergoing treatment for cervical cancer, the outcomes and eligibility criteria. The growing clinical relevance of fertility preservation underscores its increasing role in individualized treatment planning for cervical cancer patients.

Key words

treatment, cervical cancer, fertility

INTRODUCTION

Despite the prevalence of screening and the presence of vaccination for HPV, in 2022, cervical cancer was the second leading cause of death for women aged 20–39, and the fourth common cancer in women globally [1]. Almost 40% of patients diagnosed with cervical cancer are women of reproductive age [2]. At the same time, the average age at which women decide to have their first pregnancy is shifting significantly, which contributes to the fact that cervical cancer at an early stage is detected in women who have not completed their reproductive plans. Effective treatment of cervical cancer in the early stages and the use of minimally invasive methods allows fertility to be preserved in these women. From year-to- year the number of women at reproductive age diagnosed with cervical cancer is steadily increasing due to the use of screening programmes, and has led to the emergence of the field of fertility-sparing treatment in medicine. This is a treatment aimed at achieving the same oncologic safety as radical treatment while preserving fertility [3].

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The first concept of preserving the uterine body with appendages during radical hysterectomy was presented by Aburel in 1932 and was later cited by Dursun and many other researchers [4]. Selection of treatment methods depends on the stage of the cervical cancer, and is only possible in the early stages of disease (stage IA2-IB1) with uninvolved lymph nodes. Standard treatment for these patients is radical hysterectomy with pelvic node dissection. However, such an approach irreversibly destroys women's reproductive capabilities. According to the latest ESGO 2021 recommendations, available fertility-sparing therapeutic approaches for these patients include conization and simple trachelectomy, as well as radical trachelectomy. For patients with stage IB2 cervical cancer, neoadjuvant chemotherapy is an alternative treatment which may allow fertility-sparing surgery to be performed later [5].

The review presents a fertility-sparing treatment strategy for early-stage cervical cancer, including cervical conization, trachelectomy, and neoadjuvant chemotherapy, and also assesses obstetric outcomes.

Conization. Cervical conization is a procedure involving the removal of the conical or cylindrical portion of the cervix, encompassing the area of transformation. According to the European Society of Gynecological Oncology (ESGO), the

European Society of Radiotherapy and Oncology (ESTRO) and the European Society of Pathology (ESP), conical cervical resection can be used to treat cervical cancer in women who declare a desire to preserve their fertility when certain conditions are met (Tab. 1). Loop or laser conization has been shown to be preferable to cold knife for women interested in preserving their fertility. Surgical margins of the specimen should be free of invasive and pre-invasive disease, excluding low-grade intraepithelial lesions. If positive margins are found, the conization procedure should be performed again to exclude the presence of more advanced invasive disease [5].

Table 1. Conditions for conization [5]

Procedure	Conditions
Conical cervical conization	• tumour size <2 cm (HPV-associated squamous cell carcinoma and adenocarcinoma) • no pelvic lymph node involvement (PLN) • T1A1 and T1A2 tumour regardless of lymphovascular space involvement (LVSI) status • T1B1 LVSI-negative tumour

Cervical conization is usually performed to treat advanced precancerous cervical lesions [6], the effects of which prompted studies to evaluate the efficacy of cone biopsy in the treatment of cervical cancer. Conization, together with pelvic lymph node assessment in young patients with early stages of cervical cancer, may provide oncological outcomes comparable with radical surgery, while increasing the chances of successful pregnancy and preserving reproductive capacity after the surgery [7].

The prospective ConCerv study evaluated the efficacy and oncological outcomes of conization in women with IA2-IB1 stage cervical cancer. One hundred women were qualified for the study. The median surgery age was 38 years (range 23–67). Diagnosis stages were IA2 (33%) and IB1 (67%). Histology included squamous cell carcinoma (48%) and adenocarcinoma (52%). Of these patients, 44 decided to undergo conservative treatment and had a conization followed by lymph node (LN) assessment only. Two of them had positive LN, one patient had a recurrence, giving a recurrence rate at two-year follow-up of 2.4%. The results indicate that conservative surgery is a safe and viable option for women with early-stage, low-risk cervical cancer. Pelvic lymph node assessment with sentinel node biopsy and/or full pelvic lymphadenectomy is therefore recommended in all women undergoing conization biopsy [8].

In a case series reports that included patients with stage IA1-IB1 cervical cancer who underwent cervical conization with subsequent pelvic lymphadenectomy, the median patient age was 33 years (range: 28–36). The majority (7, 87.5%) had squamous cell carcinoma, while one (12.5%) was diagnosed with adenocarcinoma. Disease stages included IA1 in five patients (62.5%), IA2 in two (25.0%), and IB1 in one (12.5%). Lymphovascular space invasion (LVSI) was identified in five patients (62.5%) based on conization specimens, but no cases showed lymph node metastasis following pelvic lymphadenectomy. It was also shown that none of the patients had a recurrence of the disease; moreover, none of the study participants required chemotherapy, radiotherapy or hysterectomy. Obstetric outcomes of the treatment were also observed. Four term pregnancies were recorded in two patients out of three actively trying to conceive; deliveries were by natural means. There was one miscarriage in the first trimester [9].

Tsaousidis Ch et al. reported on the surgical, oncological, fertility and obstetric outcomes of women after large conization (LC), a procedure performed under general anesthesia the patient positioned for lithotomy. The descending branches of the uterine artery are ligated, and the cervicouterine segment is drawn down for better access. A circular incision of the vaginal wall is made using a monopolar needle. Without entering the peritoneal cavity, the vaginovesical, rectovaginal, and lateral structures are widely separated to reveal the tumour and cervix up to the cervicouterine junction. The key step is cervicectomy with a curved monopolar needle, excising the tumour with a 1–2 cm clear margin, while preserving the parametrial and paracolpium tissues. Haemostasis is secured through electrocoagulation, and the vaginal cuff is attached to the cervical stump using sutures.

The study included 23 women who underwent LC for the treatment of cervical cancer at stages IA1 to IB2 according to the Figo classification of 2018. Before the procedure, 13 patients (56.5%) were diagnosed with adenocarcinoma, while the remaining 10 (43.5%) had squamous cell carcinoma. The average age was 31.4 years. In 16 cases, LC effectively achieved full cervical cancer removal, confirmed by pathology showing clear margins (R0 resection). However, approximately one-third of the patients (n = 7; 30.4%) required a secondary radical hysterectomy due to tumour size and margin involvement in the final LC specimen. During the study period, nine out of sixteen women attempted to conceive, all of whom successfully became pregnant, and seven patients gave birth to nine healthy infants. Cervical cerclage was required between the 13th – 16th week of pregnancy in every patient. In 10 cases (10/16; 71.4%), natural conception occurred, while assisted reproductive techniques were necessary in 28.6% (4/14). There were four miscarriages before the 15th week and one ectopic pregnancy. Oncological efficacy of this procedure is compared to radical trachelectomy, although it shows better reproductive outcomes. All participants in the study who tried to conceive, succeeded during the follow-up period. Furthermore, none of the women experienced recurrence during this time. The authors note the need for a prospective study with a larger study group [10]. (Repeated in Summary).

Fanfani et al. observed 42 women attempting to conceive after conization and pelvic lymphadenectomy for stage IA2 and IB1 cervical cancer. The median age of the patients was 32 years (range 19–44), with a median tumor size of 11 mm (range 8–20). Squamous cell carcinoma was found in 27 individuals (64.3%), adenocarcinoma was diagnosed in 13 patients (30.9%), with the remaining 2 cases (4.8%) were classified as adenosquamous carcinoma. With a median follow-up of 54 months (range 1–185), all patients survived without any evidence of disease. Across the entire cohort, three individuals had a recurrence, leading to a total recurrence rate of 7.1%. Of the 42 patients in this study, 22 (52.4%) attempted to conceive and 12 were successful in achieving a pregnancy, giving a pregnancy rate of 54.4%. The median interval between fertility-sparing surgery and pregnancy was two years. A total of 18 pregnancies were observed in 17 patients, and 12 live births were reported, of which six were premature. Five premature births were attributed to cervical insufficiency, while one was caused

by an oncological factor. Two miscarriages were reported, one occurring in the first trimester and the other in the second trimester [5]. These results highlight the possibility of fertility preservation in selected patients, although there is an increased risk of preterm birth and miscarriage.

The proportion of total cervical volume and the amount of tissue removed may play a crucial role in preserving cervical function [11]. Treatment failure was less likely with longer excised cone lengths, whereas the risk of preterm birth increased in direct proportion to cone length. The removal of more than 1 cm^3 of tissue was linked to a significantly increased risk of preterm premature rupture of the amniotic membranes, prematurity, and reduced birthweight [12]. The risk of preterm delivery and low birth weight was significantly higher with CKC treatment, compared to loop electrosurgical excision procedure or laser procedures [11].

Fertility-sparing management, including conization, should only be offered to patients after a thorough and detailed presentation of the risks, potential benefits, and available alternatives [13]. It is important to find an appropriate compromise between the efficacy of oncological treatment, patient safety and the preservation of reproductive capacity and successful pregnancy outcomes [14].

Trachelectomy. Trachelectomy is a fertility-sparing procedure for patients with early-stage cervical cancer. Simple and radical trachelectomy can be distinguished. During simple trachelectomy, only the cervix is removed, while during radical surgery, the cervix, nearby tissues and the upper part of the vagina are removed. Pelvic lymph nodes may also be removed, or a sentinel node biopsy may be performed [15]. The type of trachelectomy performed depends on the stage of the disease (Tab. 2). Based on the retrospective literature, it can be concluded that the oncological results of trachelectomy are equivalent to radical hysterectomy.

Table 2. A) Comparison of trachelectomy types [15,16]

Procedure	Indicated stages
Simple trachelectomy	IA1 IA2 patients without lymph node involvement and without infiltration of the vascular spaces
Radical trachelectomy (type A)	1A1 1A2 patients without lymph node involvement but with known infiltration of the vascular spaces
Radical trachelectomy (type B)	1B1 with a lesion of the largest dimension ≤ 2 cm without lymph node involvement, with infiltration of the vascular spaces

Trachelectomy should be performed in centres with experience in fertility-sparing surgery. This allows for histopathological examination of frozen sections. Detection of lymph node involvement requires modification of the surgical plan and transition to radical hysterectomy or definitive chemoradiotherapy.

A meta-analysis from 2021 published by Guo et. al. compared the two treatments. The duration of surgery for radical trachelectomy (RT) was relatively longer than for radical hysterectomy (RH). Patients undergoing RT had similar blood loss compared to patients after RH. Patients in the RT group spent less time in the hospital after surgery. There were no statistically significant differences in risk of recurrence, intraoperative or postoperative complications, five-year overall survival, and recurrence-free survival between the two groups.

Trachelectomy was first published as a vaginal approach, but other approaches can now be distinguished, including laparotomy, laparoscopy and robotics. Abdominal trachelectomy allows surgeons to overcome limitations such as patient anatomy, surgical experience and resources to provide this revolutionary surgery to women everywhere [18]. Therefore, in this regard it can be concluded that hysterectomy and radical trachelectomy show comparable results.

More than 900 cases of trachelectomy have been reported in the literature since 2015, with an overall pregnancy rate of 30% for transvaginal trachelectomy (VRT) and 15% for transabdominal trachelectomy (ART). For simple trachelectomy (ST), the pregnancy rate was approximately 50%. Preterm delivery before 32 weeks and between 32 – 37 weeks of gestation was observed in approximately 12% and 28% for VRT and ART, respectively [19].

Until recently, the standard treatment for stage IA2 cervical cancer was radical hysterectomy with pelvic lymph node removal. As many patients develop cervical cancer of reproductive age, they often express a desire to preserve their fertility, therefore, in such cases, radical vaginal trachelectomy may be an alternative [20]. In situations where the risk of local and distant metastasis is low, a less invasive option, such as simple trachelectomy, may be considered. Recurrence rates after radical trachelectomy range from 0% – 8%.

FIGO stage IB1 tumours are the most challenging group of tumours are. For tumours smaller than 2 cm, fertility-sparing surgical approaches such as vaginal or abdominal radical trachelectomy are considered safe and effective options, offering comparable oncological outcomes and favourable reproductive results [21]. IB1 tumours larger than 2 cm in diameter and IB2 tumours with a risk of lymph node involvement of 30–40%, are considered unsuitable for fertility-sparing surgery or with a low chance of fertility preservation [22]. In patients with stage IB1 cervical cancer with tumours < 4 cm who underwent radical trachelectomy, the recurrence rate has been shown to be significantly lower for tumours < 2 cm, compared to lesions between 2–4 cm [23].

Wethington's report from 2016 shows the results of trachelectomy performed in patients with stage IB1 cervical cancer and tumours measuring 2–4 cm, a group traditionally considered unsuitable for fertility-sparing surgery. Among 29 patients, fertility was preserved in 31%, and after a median follow-up period of 44 months, only one case of disease recurrence was reported. The authors concluded that patients with stage IB1 tumours 2–4 cm in diameter and favourable histology (squamous cell carcinoma, squamous adenocarcinoma, adenocarcinoma), may be candidates for radical trachelectomy.[23].

In 2012, Palaia et al. reported favourable oncological and reproductive outcomes of simple trachelectomy with pelvic lymphadenectomy in 14 young patients with early-stage cervical cancer. Inclusion criteria included age up to 38 years, desire to preserve fertility, stage IB1 or earlier disease, tumour less than 2 cm in diameter, absence of LVSI (lytic lymphatic vessel invasion) and no lymph node metastasis. After 56 months, there were no recurrences. Eight patients became pregnant and three of them gave birth at term. The authors concluded that simple trachelectomy is a safe treatment option in patients with early-stage, low-risk cervical cancer. [24]. Biliatis et al. evaluated the outcomes in patients with

stage IB1 small volume cervical cancer, (<500 mm³). In a group of 62 patients, no recurrences were observed after a mean follow-up time of 56 months. In the group treated with loop biopsy, seven patients became pregnant and delivered seven live babies. No miscarriages or preterm births were reported [25]. Wu et. al. analyzed the results of trachelectomy in 10 young female stage IB1 patients who underwent the procedure between 2002 – 2015 at the National University Hospital in Taiwan. All patients underwent an MRI scan before surgery to further assess the stage of the tumour. Among the 10 patients, seven underwent VRT and three underwent ART. Post-operative pathological examination showed that seven patients had squamous cell carcinoma and three had adenocarcinoma. After surgery, menstruation returned in all patients within eight weeks and three patients who underwent VRT had miscarriages. None of the patients had a live birth [26]. Pareja et. al. reviewed the literature on obstetric outcomes in stage IB1 patients who underwent radical trachelectomy, comparing them with outcomes after neoadjuvant chemotherapy and subsequent fertility-sparing surgery. Fertility preservation rates were, respectively: 82.7% (ART with tumours >2 cm), 85.1% (ART with tumours of any size), 89% (NACT with subsequent surgery) and 91.1% (VRT with tumours of any size). Pregnancy rates were, respectively: 16.2%, 24% and 30.7% for ART, VRT and NACT with fertility-sparing surgery. Sanchez-Migallon et. al. described the case of a patient with stage IB1 cervical cancer who, after VRT treatment, gave birth to two children who ended up in preterm labour, associated with some neonatal morbidity [28].

The results cited above should be taken into account when choosing a treatment technique in patients with tumours larger than 2 cm [27].

Neoadjuvant chemotherapy (NACT). It is difficult to determine the optimal management for patients with cervical cancer in FIGO stage IB2 (>2 and <4cm) who want to preserve fertility. The standard treatment for these patients includes radical hysterectomy with pelvic lymphadenectomy, but it does not preserve fertility. Trachelectomy alone in this case increases the recurrence rate, and is considered an unsafe form of treatment which increases the recurrence rate [5].

Currently, among the available treatments at this stage for women who wish to preserve fertility, there are two options: radical abdominal trachelectomy with pelvic lymphadenectomy (NACT) with subsequent surgery, such as vaginal trachelectomy or conization. A study by Cao et al. comparing the efficacy of abdominal trachelectomy and vaginal trachelectomy showed a significantly higher obstetric success rate when vaginal trachelectomy was used (8.8% vs. 39.5%)[5]. This supports the use of the second method that includes NACT. Response rate to NACT is 92% with lesions 2–4cm in size [29]. Maneno et al. was the first to describe the use of NACT in stage IB1 cervical cancer. Between 1995 – 2007, 51 women were included in the study who received cisplatin, paclitaxel and ifosfamide, followed by conization with pelvic lymphadenectomy. The reduction in tumour size, allowing removal of only the cervical cone compared to the entire cervix, confirmed the effectiveness of this method [30]. NACT is a therapeutic option for these women. It is used to reduce the size of the tumour, metastases, parametrial invasion, and thus the possibility of surgical treatment. The study by Burbano et al., in 2009? in which most patients (92.2%) were FIGO stage IB 2009, used a combination of cis platinum with paclitaxel or ifosfamide as the preferred form of treatment. 87.8% of patients underwent fertility-sparing surgeries, such as radical vaginal trachelectomy (34.4%), abdominal trachelectomy (27.2%), conization (18.9%) and simple trachelectomy (14.4%). Among the women who chose to become pregnant after treatment, gestation was achieved in 84.8% of women [31]. Also, in a systematic review considering 18 articles and 249 patients, there were 64 pregnancies of which 49 (76.6%) carried to term [29]. From September 2009 – September 2018, in a study involving 18 patients with FIGO stage IB2 cervical cancer received NACT consisting of cisplatin or carboplatin with paclitaxel. Complete remission was observed in seven women, three needed RH with pelvic lymph node dissection (PLND) and one received chemoradiation after PLND because of positive lymph nodes. VRT was performed on the remaining 14 women. Fertility was preserved in 78% of the women. This proves that NACT in stage 1B2 followed by VRT has promising results [32].

An ongoing study which is scheduled to end in 2025 is CONTESSA/NEOCON-F, which included premenopausal women with FIGO IB2 cervical cancer who wish to preserve their fertility. They received three cycles of platinum/paclitaxel chemotherapy. Patients who had a complete or partial response received surgical fertility-sparing treatment, such as conization or simple trachelectomy [33].

What about patients with tumors larger than 4 cm? A 2022 systematic review included patients at this stage who received platinum-based chemotherapy as a form of treatment and fertility-sparing surgical in the form of conization, simple or radical trachelectomy. The study was carried out in all 40 patients included in 11 studies, in whom the treatment was successful in 26 of them (65%). Two patients had a recurrence (7.7%) Four of the six patients who wanted to get pregnant were successful [34].

The best treatment strategy for such patients is still unclear. The most important criterion is oncologic safety, and the appropriate selection of patients eligible for neoadjuvant treatment and fertility-sparing surgery.

Immunotherapy. What if chemotherapy is ineffective? Does this mean that minimally invasive methods are ruled out, and fertility-limiting methods must be used? In this case, the solution seems to be immunotherapy with checkpoint inhibitors (PD-1/PD-L1) which block the pathway, restore the function of cytotoxic T cells and their ability to recognize and destroy cancer cells in the tumour microenvironment. A review of clinical trials of pembrolizumab in advanced or recurrent cases of cervical cancer shows that this drug may be an effective treatment option in PD-L1-positive tumours after progression following chemotherapy [35]. Pembrolizumab and Cemiplimab demonstrated improved overall survival (OS) and objective response rate (ORR), compared to chemotherapy in second-line treatment. In addition, pembrolizumab, used in combination with chemotherapy (with or without bevacizumab), has been introduced as a first-line treatment option in selected patients. The use of immunotherapy prior to surgical treatment could in future contribute to reducing tumour mass and thus enabling less extensive surgical procedures, which is crucial for young patients who wish to preserve their fertility [36].

DISCUSSION

It cannot be denied that the role of fertility-sparing treatment is increasing. This is the result of advances in methods for the early detection of cancerous lesions and changes in the number of women of reproductive age diagnosed with cervical cancer. Analysis of the literature on the treatment of cervical cancer has raised many questions. Can fertility-sparing treatment be considered as highly efficient? Is it as effective as standard radical-based treatment? There is a noticeable trend toward less radical surgery for early-stage, low-risk cervical cancer, and many studies have shown that the use of conization and trachelectomy promotes a reduction in the use of radical forms of treatment, thus reducing the risk of complications [7, 37, 38]. This has certainly contributed to the growing role of both procedures in the treatment of cervical cancer.

However, despite the promising results, further research is required and precise pathological criteria for fertility-sparing treatment of women with early cervical cancer need to be formulated [8]. This has certainly contributed to the growing role of both procedures in the treatment of cervical cancer.

Pregnancy rates following the use of conization and trachelectomy are promising. It would also be worthwhile to consider the course of such pregnancies. Are they different from pregnancies in healthy women? What does childbirth look like? In a study by Zhag et al. comparing conization and trachelectomy, the basis of such features as: pregnancy, miscarriage and premature birth rates, the results of conization compared to trachelectomy were as follows: 36.1%, 14.8% and 6.8% compared to 20.5%, 24% and 26.6%. In the study by Zhang et al., conization had a higher pregnancy rate and better pregnancy outcome compared to radical trachelectomy [39]. Also, a significant equality in pregnancy rate can noted depending on the method of trachelectomy. Vaginal radical trachelectomy compared to abdominal and laparoscopic radical trachelectomy has a higher pregnancy rate. Also, the risk of pre- term birth is the lowest in the vaginal group [40]. What method of delivery should be choosen after conization and trachelectomy? While vaginal delivery is often possible after conization, it is rarely feasible post-trachelectomy. In such cases, caesarean section is the preferred and safe approach [41]. It should not be forgotten that pregnancy following fertility-sparing treatment, particularly radical trachelectomy, is associated with increased obstetric risks, including second-trimester premature rupture of membranes and preterm delivery. As shown by Shinkai et al. (2020), such complications may arise due to cervical insufficiency despite cerclage, and caesarean section remains the standard mode of delivery in these cases [42].

Without the development of NACT, it would be impossible to treat the more advanced forms of cervical cancer based on fertility preservation. However, in the latest ESGO 2021 recommendations, this treatment method is still controversial and considered experimental [5]. The combination of NACT with conization or trachelectomy has shown promising results, with the use of cisplatin, paclitaxel and ifosfamide followed by fertility sparing surgeries such as radical vaginal trachelectomy, abdominal trachelectomy, conization and simple trachelectomy, showing a high pregnancy rate [31].

The most important question is how to treat lesions larger than 4cm? Is NACT possible? Is fertility sparing treatment in this case possible and is it safe? The number of studies on this topic is limited, and despite several studies identifying the use of platinum- based chemotherapy followed by conization, and simple or radical trachelectomy as effective, the staging of cervical cancer in terms of fertility sparing treatment remains in the realm of research [34].

The rate of recurrence after NACT remains an important issue and according to the latest data, they amount to 10%. The question remains whether such a risk is acceptable? Undoubtedly, lymph node evaluation should be an important diagnostic element. Sentinel node biopsy and pelvic lymphadenectomy seem to be the best option to exclude patients with positive lymph nodes [31]. Pelvic lymphadenectomy is a standard part of surgical treatment for patients with early-stage cervical cancer and involves the radical removal of lymph nodes, along with surrounding lymphatic tissue along the iliac vessels. However, this procedure has significant limitations. It prolongs the duration of surgery and increases the risk of perioperative complications, such as damage to vascular and nerve structures, venous thromboembolism, lymphoedema, lymphatic cyst formation – and even death. Furthermore, its use in patients in the early stages of the disease often does not translate into significant therapeutic benefits, as most patients do not have metastases to regional lymph nodes [44]. Sentinel lymph node biopsy is a less invasive diagnostic and therapeutic approach focused on identifying and removing lymph nodes at highest risk for metastasis. In the absence of lymph nodes metastases, this technique allows for the omission of systematic lymphadenectomy, significantly reducing postoperative complication rates. Oncological outcomes are comparable to those of patients undergoing total pelvic lymphadenectomy; however, further prospective studies are needed to confirm the long-term efficacy of this method [45].

But what about patients undergoing radiotherapy or chemotherapy? These treatments carry a high risk of gonadotoxicity. In these patients, it is worth considering fertility preservation techniques before starting cancer treatment. Two of the most frequently described methods are oocyte cryopreservation, which allows reproductive potential to be preserved, and ovarian transposition, which moves the ovaries outside the radiation area [46]. The choice and effectiveness of the appropriate method depend on several factors, including the stage of the disease, the planned oncological treatment, and the amount of time before the treatment begins. For this reason, patients should be referred to qualified reference centres [47,48].

In answering the question of what is the best treatment for women in reproductive age with cervical cancer, the most important involve constant evaluation of the patient's condition, selection of treatment methods based on current classifications, and stage of the tumour. Fertility-sparing treatment should never lead to delay or selection of the wrong treatment in favour of maintaining reproductive options.

CONCLUSIONS

Fertility-sparing treatment, such as conization, simple and radical trachelectomy with pelvic node dissection, including proper classification of tumour lesions and precise staging for patients with early-stage cervical cancer, is an

available therapeutic solution with survival outcomes and low recurrence rate compared to radical hysterectomy, and maintains the ability to reproduce. For patients with large tumours (2–4 cm) for whom the above-mentioned treatments cannot be used, NACT with the use of cisplatin, paclitaxel and ifosfamide appears to be a good option, as well as immunotherapy (PD-1/PD-L1) used when other methods are ineffective. Nevertheless, one of the key issues remains the detection of cervical cancer in its early stages. However, despite the significant progress made in fertility-sparing treatment trials, more research is needed to assess long-term oncological and reproductive outcomes.

REFERENCES

1. Siegel RL, Miller KD, Jemal A. Statystyki dotyczące raka, 2020. CA Rak J Klin. Amerykańskie Towarzystwo Onkologiczne; 1. Styczeń 2020 [zitiert 5. Dezember 2024];70(1):7–30. Verfgbar unter: https://onlinelibrary.wiley.com/doi/full/10.3322/caac.21590
2. Hallquist Viale, RN, MS, CNS, ANP P. Fakty i liczby Amerykańskiego Towarzystwa Onkologicznego: Edycja 2020. J Adv Praktyka Oncol. Harborside Press, LLC; 1. Marzec 2020 [zitiert 5. Grudzień 2024];11(2):135. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC7848816/
3. Fricová L, Sláma J. Aktualna wiedza na temat leczenia oszczędzającego płodność pacjentów z rakiem szyjki macicy. Ginekolog Ceska. Czeskie Stowarzyszenie Medyczne J.E. Purkyne; 2022;87(5):362–70.
4. Dursun P, Ayhan A, Kuscu E. Nowe podejścia chirurgiczne do leczenia raka szyjki macicy. Europejski Dziennik Onkologii Chirurgicznej. Elsevier; 1. Maj 2008 [zitiert 6. Styczeń 2025];34(5):487–96. Verfgbar unter: http://www.ejso.com/article/S0748798307002843/fulltext
5. Cibula D, Raspollini MR, Planchamp F, Centeno C, Chargari C, Felix A, u. a. Wytyczne ESGO/ESTRO/ESP dotyczące postępowania z pacjentami z rakiem szyjki macicy – Aktualizacja 2023. Łuk Virchows. Springer Science and Business Media Deutschland GmbH; 1. Czerwiec 2023 [zitiert 11. Kwiecień 2024];482(6):935–66. Verfgbar unter: http://www.ncbi.nlm.nih.gov/pubmed/37145263
6. Mosseri J, Hocquemiller R, Mergui JL, Uzan C, Canlorbe G. Konizacja laserowa w śródnabłonkowej neoplazji szyjki macicy: Skuteczność i wyniki położnicze. J Gynecol Obstet Hum Reprod. J Gynecol Obstet Hum Reprod; 1. Kwiecień 2022 [zitiert 7. Styczeń 2025];51(4). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/35181542/
7. Wang Y, Chen Y, Wang M, Qin Z, Zhang L, Zheng A, u. a. Onkologiczne i reprodukcyjne wyniki konizacji połączone z oceną węzłów miednicy u pacjentów z wczesnym stadium raka szyjki macicy: przegląd systematyczny i metaanaliza. Przedni Oncol. Front Oncol; 2023 [zitiert 7. Styczeń 2025];13. Verfgbar pod: https://pubmed.ncbi.nlm.nih.gov/37795440/
8. Schmeler KM, Pareja R, Blanco AL, Fregnani JH, Lopes A, Perrotta M, u. a. ConCerv: prospektywne badanie chirurgii zachowawczej w przypadku wczesnego stadium raka szyjki macicy niskiego ryzyka. Int J Gynecol Rak. Int J Gynecol Rak; 1. Październik 2021 [zitiert 7. Styczeń 2025];31(10):1317–25. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/34493587/
9. Yamamoto M, Motohara T, Iwagoi Y, Tayama S, Tashiro H, Kondoh E, u. a. Operacja oszczędzania płodności we wczesnym stadium raka szyjki macicy: Badanie serii przypadków na temat skuteczności i wykonalności konizacji szyjki macicy, a następnie limfadenektomii miednicy. J Obstet Ginekologia Res. J Obstet Gynecol Res; 1. Czerwiec 2022 [zitiert 7. Styczeń 2025];48(6):1444–50. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/35315183/
10. Tsaousidis C, Kraemer B, Kommoss S, Hartkopf A, Brucker S, Neis K, u. a. Duża konizacja – retrospektywne wyniki monocentryczne dla zachowania płodności u młodych kobiet z rakiem szyjki macicy na wczesnym stadium. Nauki o reprodukcyjnym. Springer Science and Business Media Deutschland GmbH; 1. Marzec 2021 [zitiert 7. Styczeń 2025];29(3):791. Verfgbar pod: https://pmc.ncbi.nlm.nih.gov/articles/PMC8863693/
11. Zhuang H, Hong S, Zheng L, Zhang L, Zhuang X, Wei H, u. a. Wpływ konizacji szyjki macicy na wynik ciąży: metaanaliza. J Obstet Gynecol (Lahore). Taylor i Franciszek; 2. Styczeń 2019 [zitiert 27. Luty 2025];39(1):74–81. Verfgbar unter: https://www.tandfonline.com/doi/abs/10.1080/01443615.2018.1463206
12. Athanasiou A, Veroniki AA, Efthimiou O, Kalliala I, Naci H, Bowden S, u. a. Porównawcza skuteczność i ryzyko przedwczesnego porodu miejscowych metod leczenia śródnabłonkowej neoplazji szyjki macicy i raka szyjki macicy w stadium IA1: systematyczny przegląd i metaanaliza sieci. Lancet Oncol. Elsevier Sp. z o.o.; 1. Sierpień 2022 [zitiert 21. Październik 2025];23(8):1097. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC9630146/
13. Nezhat F, Erfani H, Nezhat C. Systematyczny przegląd wyników reprodukcji i onkologicznych operacji oszczędzających płodność we wczesnym stadium raka szyjki macicy. J Turk Ger Gynecol Assoc. J Turk Ger Gynecol Assoc; 1. Grudzień 2022 [zitiert 7. Styczeń 2025];23(4):287–313. Pod adresem: https://pubmed.ncbi.nlm.nih.gov/36482657/
14. Terzic M, Makhadiyeva D, Bila J, Andjic M, Dotlic J, Aimagambetova G, u. a. Wyniki reprodukcyjne i położnicze po leczeniu raka szyjki macicy oszczędzającym płodność: obecne podejście i przyszłe kierunki. J Clin Med. J Clin Med; 1. Kwiecień 2023 [zitiert 7. Styczeń 2025];12(7). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/37048696/
15. Shim SH, Lim MC, Kim HJ, Lee M, Nam EJ, Lee JY, u. a. Czy prosta trachelektomia lub konizacja może wykazać porównywalny wskaźnik przeżycia w porównaniu z radykalną trachelektomią u pacjentów z rakiem szyjki macicy IA1 z inwazją przestrzeni limfatycznej, które chcą uratować płodność? Systematyczny przegląd i rekomendacja wytycznych. PLoS Jeden. PLoS Jeden; 1. Styczeń 2018 [zitiert 7. Styczeń 2025];13(1). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/29385139/
16. Danisch M, Kranawetter M, Bartl T, Postl M, Grimm C, Langthaler E, u. a. Wyniki onkologiczne i położnicze po radykalnej trachelektomii brzucha we wczesnym stadiu raka szyjki macicy bez niskiego ryzyka: 10-letnie austriackie doświadczenie w jednym ośrodku. J Pers Med. J Pers Med; 1. Czerwiec 2024 [zitiert 21. Październik 2025];14(6). Verfgbar pod: https://pubmed.ncbi.nlm.nih.gov/38929833/
17. Guo J, Hu Q, Deng Z, Jin X. Wyniki trachelektomii i histerektomii we wczesnym stadiu raka szyjki macicy: systematyczny przegląd i metaanaliza. Chirurgia z przodu. Frontiers Media S.A.; 11. Listopad 2021 [zitiert 4. Marzec 2025];8. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/34859038/
18. Cottrell CM, Ohaegbulam GC, Smith JR, Del Priore G. Leczenie oszczędzające płodność w raku szyjki macicy: trachelektomia brzucha. Best Pract Res Clin Obstet Gynaecol. Best Pract Res Clin Obstet Gynecol; 1. Wrzesień 2021 [zitiert 7. Styczeń 2025];75:72–81. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/33846052/
19. Schneider A, Erdemoglu E, Chiantera V, Reed N, Morice P, Rodolakis A, u. a. Zalecenie kliniczne radykalna trachelektomia w celu zachowania płodności u pacjentów z wczesnym stadium raka szyjki macicy. Int J Gynecol Rak. Int J Gynecol Cancer; Maj 2012 [zitiert 7. Styczeń 2025];22(4):659–66. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/22398708/
20. Ramirez PT, Frumovitz M, Pareja R, Lopez A, Vieira M, Ribeiro R, u. a. Minimalnie inwazyjna i radykalna histerektomia brzucha w przypadku raka szyjki macicy. N Engl J Med. N Engl J Med; 15. Listopad 2018 [zitiert 13. Maj 2024];379(20):1895–904. Verfgbar pod: https://pubmed.ncbi.nlm.nih.gov/30380365/
21. Guimarães YM, Godoy LR, Longatto-Filho A, Dos Reis R. Leczenie raka szyjki macicy w wczesnym Stadium: Przegląd literatury. Nowotwory (Bazylea). MDPI; 1. Luty 2022 [zitiert 21. Październik 2025];14(3):575. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC8833411/
22. Tomao F, Maruccio M, Preti EP, Boveri S, Ricciardi E, Zanagnolo V, u. a. Konizacja w stadium wczesnym raka szyjki macicy: wzór nawrotu w 10-letnim doświadczeniu pojedynczej instytucji. Int J Gynecol Rak. Int J Gynecol Rak; 1. Czerwiec 2017 [zitiert 21. Październik 2025];27(5):1001–8. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/28486242/
23. Wethington SL, Sonoda Y, Park KJ, Alektiar KM, Tew WP, Chi DS, u. a. Rozszerzenie wskazań do radykalnej trachelektomii: raport o 29 pacjentach z guzami na stadionie IB1 o średnicy od 2 do 4 centymetrów. Int J Gynecol Rak. Int J Gynecol Cancer; Lipiec 2013 [zitiert 7. Styczeń 2025];23(6):1092–8. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/23714706/
24. Palaia I, Musella A, Bellati F, Marchetti C, Di Donato V, Perniola G, u. a. Prosta pozazawięzkowa trachelektomia i obustronna limfadenektomia miednicy w stadium wczesnym raka szyjki macicy. Ginekolog Oncol. Ginekolog Oncol; Lipiec 2012 [zitiert 7. Styczeń 2025];126(1):78–81. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/22487540/
25. Biliatis I, Kucukmetin A, Patel A, Ratnavelu N, Cross P, Chattopadhyay S, u. a. Rak szyjki macicy na stadionie 1B1 o małej objętości: Czy radykalna operacja jest nadal konieczna? Ginekolog Oncol. Ginekolog Oncol; Lipiec 2012 [zitiert 7. Styczeń 2025];126(1):73–7. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/22465521/

26. Wu CJ, Chang WC, Chen CH, Chen CA, Huang SC, Sheu BC. Radykalna trachelektomia we wczesnym stadium raka szyjki macicy: seria przypadków i przegląd literatury. Tajwan J Obstet Ginekolog. Tajwan J Obstet Gynecol; 1. Kwiecień 2017 [zitiert 7. Styczeń 2025];56(2):143–6. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/28420497/
27. Pareja R, Rendón GJ, Vasquez M, Echeverri L, Sanz-Lomana CM, Ramirez PT. Natychmiastowa radykalna trachelektomia i chemioterapia neoadiuwantowa, a następnie operacja zachowawcza u pacjentów z rakiem szyjki macicy na etapie IB1 z guzami o długości 2 cm lub większymi: Przegląd literatury i analiza wyników onkologicznych i położniczych. Ginekolog Oncol. Ginekolog Oncol; 1. Czerwiec 2015 [zitiert 7. Styczeń 2025];137(3):574–80. Pod adresem: https://pubmed.ncbi.nlm.nih.gov/25827293/
28. Sanchez-Migallon A, Lago V, Matute L, Domingo S. Powikłania poluniczne jako wyzwanie po radykalnej trachelektomii: przegląd literatury. J Obstet Ginekolog. J Obstet Gynaecol; 2019 [zitiert 7. Styczeń 2025];39(7):885–8. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/31064268/
29. Gwacham NI, McKenzie ND, Fitzgerald ER, Ahmad S, Holloway RW. Neoadiuwantowa chemioterapia, a następnie operacja oszczędzająca płodność w przypadku raka szyjki macicy o wielkości 2–4 cm; pojawiają się dane i przyszłe perspektywy. Ginekolog Oncol. Ginekolog Oncol; 1. Wrzesień 2021 [zitiert 29. Kwiecień 2025];162(3):809–15. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/34130862/
30. Maneo A, Chiari S, Bonazzi C, Mangioni C. Neoadiuwantowa chemioterapia i chirurgia zachowawcza na stadionie IB1 raka szyjki macicy. Ginekolog Oncol. Prasa Akademicka; 1. Grudzień 2008;111(3):438–43.
31. Burbano J, Heredia F, Sanabria D, Ardila EG, Viveros-Carreño D, Rodriguez J. Neoadiuwantowa chemioterapia przed operacją oszczędzającą płodność w guzach szyjki macicy większych niż 2 cm: systematyczny przegląd płodności i wyników onkologicznych. Int J Gynecol Rak. Int J Gynecol Rak; 1. Marzec 2021 [zitiert 7. Styczeń 2025];31(3):387–98. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/33649006/
32. Zusterzeel PLM, Aarts JWM, Pol FJM, Ottevanger PB, van Ham MAPC. Neoadiuvantowa chemioterapia, astępna trachelektomia pochwowa jako leczenie oszczędzające płodność dla pacjentów z rakiem szyjki macicy FIGO 2018 na stadionie 1B2. Onkolog. Oxford University Press (OUP); 1. Lipiec 2020 [zitiert 6. Styczeń 2025];25(7):e1051. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC7356752/
33. Plante M, Van Trommel N, Lheureux S, Oza AM, Wang L, Sikorska K, u. a. FIGO 2018 etap IB2 (2–4 cm) Rak szyjki macicy leczony chemioterapią neoadiuwantową, a następnie chirurgią oszczędzania płodności (CONTESSA); chemioterapia neoadiuwantowa i chirurgia zachowawcza w raku szyjki macicy w celu zachowania płodności (NEOCON-F). Badanie PMHC, DGOG, GCIG/CCRN i wieloośrodkowe. Międzynarodowy Dziennik Raka Ginekologicznego. Czasopisma specjalistyczne BMJ; 1. Czerwiec 2019 [zitiert 5. Dezember 2024];29(5):969–75. Verfgbar unter: https://ijgc.bmj.com/content/29/5/969
34. Viveros-Carreño D, Rodriguez J, Pereira GJR, Slama J, Halaska MJ, Robova H, u. a. Operacja oszczędzająca płodność po chemioterapii neoadiuwantowej u kobiet z rakiem szyjki macicy większym niż 4 cm: przegląd systematyczny. Int J Gynecol Rak. Int J Gynecol Rak; 24. Luty 2022 [zitiert 29. Kwiecień 2025];32(4). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/35210296/
35. De Felice F, Giudice E, Bolomini G, Distefano MG, Scambia G, Fagotti A, u. Pembrolizumab na zaawansowany rak szyjki macicy: bezpieczeństwo i skuteczność. Ekspert Rev Anticancer Ther. Taylor i Franciszek; 1. Luty 2021 [zitiert 14. Styczeń 2026];21(2):221–8. Verfgbar unter: https://www.tandfonline.com/doi/abs/10.1080/14737140.2021.1850279
36. Martinez-Cannon BA, Kolombo I. Ewoluująca rola inhibitorów punktów kontrolnych układu odpornościowego w raku szyjki macicy i endometrium. Odporność na leki na raka. OAE Publishing Inc.; 2024 [zitiert 14. Styczeń 2026];7:23. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC11267150/
37. Prodromidou A, Iavazzo C, Fotiou A, Psomiadou V, Douligeris A, Vorgias G, u. a. Krótko- i długoterminowe wyniki po radykalnej trachelektomii brzusznej w porównaniu z radykalną histerektomią w stadium wczesnym raka szyjki macicy: systematyczny przegląd literatury i metaanaliza. Archi Ginekolog Obstet. Arch Ginekolog Obstet; 1. Lipiec 2019 [zitiert 7. Styczeń 2025];300(1):25–31. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/31062151/
38. Tseng JH, Aloisi A, Sonoda Y, Gardner GJ, Zivanovic O, Abu-Rustum NR, u. a. Mniej kontra bardziej radykalna operacja w stadium IB1 raka szyjki macicy: populacyjne badanie długoterminowego przeżycia. Ginekolog Oncol. Ginekolog Oncol; 1. Lipiec 2018 [zitiert 7. Styczeń 2025];150(1):44–9. Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/29776598/
39. Zhang Q, Li W, Kanis MJ, Qi G, Li M, Yang X, u. a. Wyniki onkologiczne i położnicze z leczeniem oszczędzającym płodność raka szyjki macicy: systematyczny przegląd i metaanaliza. Onkocel. Impact Journals LLC; 2017 [zitiert 7.) Styczeń 2025];8(28):46580. Verfgbar unter: https://pmc.ncbi.nlm.nih.gov/articles/PMC5542294/
40. Smith ES, Moon AS, O'hanlon R, Leitao MM, Sonoda Y, Abu-Rustum NR, u. a. Radykalna trachelektomia w leczeniu raka szyjki macicy we wczesnym stadiu: przegląd systematyczny. Położnictwo i ginekologia. Obstet Gynecol; 1. Wrzesień 2020 [zitiert 7. Styczeń 2025];136(3):533–42. Verfgbar pod: https://pubmed.ncbi.nlm.nih.gov/32769648/
41. Taliento C, Scutiero G, Battello G, Sala A, Pellecchia G, Trozzi R, u. a. Reprodukcyjne, połowowe i onkologiczne wyniki leczenia oszczędzającego płodność raka szyjki macicy zgodnie z systemem stagingowym FIGO 2018: przegląd systematyczny. Eur J Surg Oncol. Eur J Surg Oncol; 1. Styczeń 2025 [zitiert 21. Październik 2025];51(1). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/39531915/
42. Shinkai S, Ishioka S, Mariya T, Fujibe Y, Kim M, Someya M, u. a. Ciąże po radykalnej trachelektomii pochwy (RT) u pacjentek z wczesnym inwazyjnym rakiem szyjki macicy: wyniki z jednego instytutu. BMC Ciąża Poród. BMC Ciąża Poród; 25. Kwiecień 2020 [zitiert 21. Październik 2025];20(1). Verfgbar unter: https://pubmed.ncbi.nlm.nih.gov/32334568/
43. Tu H, Huang H, Li Y, Chen X, Wang C, Zheng M, u. a. Biopsja Węzła Wartowniczego i Chłonnego samodzielnie lub z Limfadenektomią w Raku Szyjki Macicy. New England Journal of Medicine. Towarzystwo Medyczne Massachusetts; 16. Październik 2025 [zitiert 14. Styczeń 2026];393(15):1463–74. Verfgbar pod: https://www.nejm.org/doi/abs/10.1056/NEJMoa2506267
44. Martin TM, Castro CC, Glickman A, Carreras N, Valenzuela A, Fusté P, u. a. Biopsja węzła chłonnego warcznego i limfadenektomia miednicy na wczesnym stadium raka szyjki macicy: retrospektywny przegląd instytucjonalny. Archi Ginekolog Obstet. Springer Science and Business Media Deutschland GmbH; 1. Październik 2025 [zitiert 14. Styczeń 2026];312(4):1327–35. Verfgbar unter: https://link.springer.com/article/10.1007/s00404-025-08134-z
45. Silvestris E, Paradiso AV, Minoia C, Daniele A, Cormio G, Tinelli R, u. a. Techniki zachowania płodności w raku szyjki macicy. Journal of Bone and Joint Surgery. Lippincott Williams i Wilkins; 29. Kwiecień 2022 [zitiert 14. Styczeń 2026];101(17):E29163. Verfgbar unter: https://journals.lww.com/md-journal/fulltext/2022/04290/fertility_preservation_techniques_in_cervical.10.aspx
46. Silvestris E, Virgilio Paradiso A, Minoia C, Daniele A, Cormio G, Tinelli R, u. a. Techniki zachowania płodności w raku szyjki macicy. 2022 [zitiert 14. Styczeń 2026]; Verfgbar unter: http://dx.doi.org/10.1097/MD.0000000000029163
47. Zaami S, Vergallo GM, Moscatelli M, Napoletano S, Sernia S, La Torre G. Onkofertility: Znaczenie poradnictwa w zakresie zachowania płodności u pacjentów z rakiem. Eur Rev Med Pharmacol Sci. Verduci Editore s.r.l; 2021;25(22):6874–80.