**INTRODUCTION**

Cervical cancer is one of the most common cancers affecting women of childbearing age, with up to 42% of cases being diagnosed in women prior to the age of 45.

The traditional treatment for cervical cancer – radical surgery and/or chemoradiation therapy – does not allow the preservation of a functional utero-ovarian system for reproductive purposes.

In countries where cervical cancer screening programs are in place, a significant proportion of cervical cancer is diagnosed at an early stage, making radical trachelectomy an accepted therapeutic option in women who want to preserve fertility.

Trachelectomy is a procedure first described by the French gynaecologist Daniel Dargent in 1987, which is indicated for early stage cervical carcinoma (FIGO stage IA1/IB1, with less than 2 cm). It is a locally radical surgery that allows preservation of the body of the uterus, making childbearing possible at the expense of an increased risk of second-trimester abortion, premature rupture of membranes, and preterm delivery in a subsequent pregnancy. The results reported over the last two decades have confirmed a cancer recurrence rate of less than 5%, with promising fertility and obstetrical outcomes. Nevertheless, the obstetrical management of these patients has not been formally addressed, and some concerns have been raised regarding pregnancy surveillance in this population.

In this study, we analyze the pregnancy outcomes of women who underwent vaginal trachelectomy, and whose subsequent pregnancies were surveilled at our maternal-fetal unit.

**CASE REPORT**

We performed a retrospective review and analysis of clinical data concerning four pregnancies in three different patients.
Obstetric outcomes after radical tracheectomy in a series of four pregnancies

Two of the four pregnancies were delivered at term.

At early second trimester the cervix was measured by vaginal ultrasound, and the patients were submitted to a Saling procedure at 14 weeks of gestation if the cervix length was less than 15 mm. The Saling procedure was performed in another hospital in the same city, and consisted on removing part of the superficial epithelium of the cervix and proximal vagina and stitching it over the cervix obtaining a cervical occlusion in order to prevent infection. All Saling procedures were performed under loco-regional anesthesia. This procedure was performed in three pregnancies around the 14th week of gestation. Two of the procedures were performed in the same patient in consecutive pregnancies. In one patient this procedure was not considered necessary as the cervix length was 15 mm.

Betamethasone was administrated to all women for fetal lung maturation (two administrations of 12 mg with a 24 hour interval) between 26 and 30 weeks of gestation, due to the known risk of preterm delivery.

One patient needed tocolytic therapy due to preterm contractions, and nifedipine 10 mg every 6 hours orally was prescribed, from the 26th week of gestation till 29th week, when preterm premature rupture of membranes occurred.

Caesarean section was performed to all women who reached the third trimester, no longer than 37 weeks, with repermeabilization of the cervical canal by digital dilation in all cases submitted to Saling procedure. No perioperative complications were registered.

There were no neonatal deaths. The premature newborn was admitted to the Neonatal Intensive Care Unit and was discharged at day 44.

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**TABLE 1. INDIVIDUAL CASE DATA CONCERNING MATERNAL CHARACTERISTICS AND OBSTETRICAL OUTCOMES**

<table>
<thead>
<tr>
<th>Case Nr.</th>
<th>Age (y)</th>
<th>Previous Gestations</th>
<th>Saling Procedure</th>
<th>Pregnancy Course</th>
<th>Gestational Age at Delivery (wk)</th>
<th>Perinatal Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>31</td>
<td>G1P0</td>
<td>Yes</td>
<td>PPROM</td>
<td>29</td>
<td>1490g AS 9/10</td>
</tr>
<tr>
<td>2*</td>
<td>33</td>
<td>G2P1</td>
<td>Yes</td>
<td>PPROM, chorioamnionitis</td>
<td>18</td>
<td>Late Abortion</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>G1P0</td>
<td>Yes</td>
<td>Elective cesarean section</td>
<td>37</td>
<td>2545g AS 10/10</td>
</tr>
<tr>
<td>4</td>
<td>31</td>
<td>G1P0</td>
<td>No</td>
<td>Elective cesarean section</td>
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* These two different case numbers represent two pregnancies in the same patient.

PPROM: Preterm premature rupture of membranes; AS: Apgar score.

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**Figures:**

*Fig 1.* This figure illustrates the process of radical tracheectomy and cervical occlusion as a treatment for cervical incompetence. The procedure involves a radical vaginal tracheectomy combined with a Saling procedure to occlude the cervix. The figure highlights the importance of this procedure in preserving fertility and reducing the risk of preterm delivery.

*Fig 2.* This figure shows the histopathological examination of the cervical tissue after the Saling procedure. The tissue was evaluated for evidence of cervical occlusion and the effectiveness of the procedure.

*Fig 3.* This figure demonstrates the follow-up of the patients post-radical tracheectomy, showing the outcomes of the pregnancies and the overall maternal health.

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**Table:**

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PPROM: Preterm premature rupture of membranes; AS: Apgar score.
DISCUSSION

Obstetric surveillance of women previously submitted to radical trachelectomy poses several challenges to the obstetrician, with clinical management being usually empirical rather than evidence-based. There is evidence that these pregnancies entail a higher risk of adverse perinatal outcomes. The most common complications associated with pregnancy after trachelectomy are preterm labor, prematurity, premature rupture of membranes, and second trimester pregnancy loss, which are in line with our findings. Notwithstanding, a recent study reports obstetric results that are considerably more favorable than previously reported ones, with a rate of second trimester pregnancy loss and significant prematurity (less than 32 weeks) of 3% and 4%, respectively. As the authors state, this discrepancy might be related to differences in the length of the remaining cervix. In our study, 2 out of 4 pregnancies were complicated with PPROM, and this situation occurred in the same patient, in both pregnancies. This patient had a cervical length inferior to 15 mm at 14 weeks of gestation. Thus, differences in cervical length might be in the core of this issue.

Performing a Saling procedure is controversial. It has been advocated as a cervical occlusion, in order to prevent ascending infection and subsequent chorioamnionitis. These patients are more prone to infection due to the presence of a cerclage with a monofilament non-absorbable suture, placed during the trachelectomy procedure in a neo-cervix not protected by a cervical mucus plug. In agreement with the surgeon who performed the trachelectomies, we only advised a Saling procedure if the cervical length was inferior to 15 mm at 14 weeks of gestation. In 3 of the 4 pregnancies, a Saling procedure was performed, with only 1 of these 3 pregnancies reaching term. This might be related to the fact that these pregnancies encompassed a greater risk a priori, due to a shorter cervix, and these findings are emphasized by the fact that the only patient who did not have an indication for a Saling procedure, reached term. We did not observe any complications directly related to the Saling procedure. Nonetheless, this procedure should only be performed when indicated.

The uterine evacuation that followed the 2nd trimester abortion was mandatory, because after the procedure of trachelectomy, the cervix becomes incapable of dilation, so it is necessary to dilate the cervix mechanically and then perform the vaginal uterine evacuation.

Given the high risk of preterm birth, all patients received corticosteroids for induction of fetal lung maturation, although this is not a universally recommended practice.

After a trachelectomy, delivery should be performed by cesarean section, since a vaginal delivery would comprise multiple risks in view of the presence of a short-scarred cervix and of the proximity of the uterine vessels. For these reasons, it has been advised to schedule an elective cesarean at 37-38 weeks of gestation, in an attempt to avoid spontaneous labor. The cesarean technique has also been the subject of discussion, with some authors recommending a low-transverse uterine incision and others favoring the longitudinal midline incision, due to the potential risk of transverse incision extending into the uterine vessels.

In our study, all cesarean sections were performed using a low-transverse incision and we did not observe any complications.

Preservation of childbearing function, by means of a trachelectomy, is a great possibility for patients with early-stage cervical cancer. It is necessary that all clinicians are aware of this procedure and its consequences, mostly regarding a subsequent pregnancy, even if it is not performed in their centers. Once pregnant, these patients should be closely surveilled. However, there are no clear guidelines regarding this antenatal surveillance. Given the high risk for preterm delivery, we advise that obstetrical management should be undertaken in a fetal-maternal unit included in a tertiary hospital, in order to achieve the best outcome. There are still several issues concerning perinatal and intrapartum care lacking clarification, such as bed rest and sexual intercourse during pregnancy, prophylactic corticosteroids for fetal lung maturation and the cesarean section technique. These and other issues remain unsolved and are challenging subjects for further research.

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