



Hysteroscopic metroplasty for the septate uterus with diode laser: a pilot study



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ABSTRACT

Objective: To evaluate the feasibility and safety of office hysteroscopic metroplasty using a 980 nm diode laser.

Study design: 18 patients were treated for septate uterus between 2013 and 2016. The indications for hysteroscopic metroplasty were recurrent abortion in 11 of the women and primary infertility in the other seven. We used a 5 mm-office hysteroscope with a diode laser fibre. After exploration of the cavity, the septum was divided with use of the laser fibre.

Results: Operating time was $13,16 \pm 1,33$ min. Intraoperative pain was $3,05 \pm 0,72$. No intraoperative or postoperative complications were observed. Follow-up performed 2 months after the hysteroscopic metroplasty confirmed the complete removal of the septum and no evidence of intrauterine synechiae.

Conclusion: Office hysteroscopic metroplasty with use of a diode laser is safe and feasible; we believe that vaporization of the septum with a diode laser could reduce the formation of adhesions and consequently reduce the occurrence of septum persistence.

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Introduction

Septate uterus is the most common congenital uterine anomaly, and it is a known factor in infertility and a cause of first and second trimester spontaneous miscarriage and preterm delivery. Fetal malpresentation and placental anomalies have also been reported [1]. A failure in the absorption of the partition between the two fused müllerian ducts results in a septum that divides the uterine cavity, although externally, there is a normal single uterus. The American Society for Reproductive Medicine (ASRM) classifies the uterine septa as class Va (complete septate uterus, with a frequency of 30–35%) or class Vb (partial septate uterus, 65–70%) [2]. The CONUTA ESHRE-ESGE Working group has developed a new classification system for congenital anomalies of the female genital tract, with a septate uterus (Class U2) further classified according to the degree of uterus corpus deformity: In sub-class U2a there is a partial septate (a septum partially divides the uterine cavity above the level of the internal cervical os), and in sub-classes

U2b there is a completely septate uterus (where the uterine cavity is divided up to the level of the internal cervical os) [3]. Several studies have showed unfavourable obstetric outcomes when a complete or incomplete septum is not treated. Metroplasty improves pregnancy outcomes between 5% and 90% [4,5]. Due to the adverse effects of a septate uterus on reproductive outcomes, treatment is indicated for women with this anomaly, and this should preferably be done before any potential obstetric complications occur. This is particularly true for women with reduced fertility (>35 years old), with reproductive disorders (unexplained infertility), and before assisted reproductive techniques are engaged. There is no need to treat women with no wish for pregnancy [6–8].

Surgical correction is applied as a prophylactic procedure to avoid the high incidence of spontaneous abortions and the complications that a woman with a septate uterus could experience during labour. Hysteroscopy is the gold standard for uterine metroplasty; it can be performed with scissors or a resectoscope. Choe and Baggish [9] and Donnez and Nisolle [10] have used the Nd-Yag laser while Daniell [11] have used the KTP or Argon laser. We present a pilot study of treatment of incomplete uterine septum using a diode laser with office hysteroscopy. A diode is an electronic

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laser consisting of two semiconductor materials the size of a grain of sand. A microprocessor-controlled system regulates the flow of electrical current through the diode and generates the laser beam. This beam is transmitted through an optical system to an optical fibre, which is the medium through which light reaches the location requiring surgery. The diode laser produces two wavelengths from 980 to 1470 nm. These wavelengths cut and vaporize the tissue while simultaneously promoting absorption of haemoglobin and H₂O resulting in excellent haemostasis, cutting and vaporization. The diode laser creates a significantly higher haemostasis than the CO₂ laser. The thermal penetration of the diode laser is smaller than that of the Nd-YAG laser enabling the surgery to be precise and safe even when close to delicate anatomical structures. The device has already been used in hysteroscopic and laparoscopic procedures [12–15].

To the best of our knowledge, this is the first study on hysteroscopic metroplasty using the diode laser.

Purpose

The aim of this study was to assess the feasibility, safety and efficacy of the continuous diode laser in the treatment of septate uterus and to evaluate the reproductive outcomes.

Materials and methods

This pilot study included 18 women with a partial septate uterus as diagnosed in the Endoscopic Centres of the Universities of Cagliari and Foggia between November 2013 and March 2016.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients to be included in the study. All women underwent a transvaginal ultrasound 3-dimensional (3-D) test to evaluate their uterine morphology and to omit those with bicornuate uterus [16]. Women recruited for the study presented with V-b or Class U2a septate uterus, in according with ASRM guidelines [2] and the ESHRE-ESGE classification [3]. Starting on day one of the menstrual cycle, every patients received 5 mg per day of norgestrel acetate (Norgestrol Acetato, Farmitalia, Italy) for 14 days before operative hysteroscopy for a better visualization during the procedure as previously described [17]. All procedures were performed by the two operators (L.N. and S.A.) using a 5 mm Bettocchi[®] hysteroscope (Karl Storz GmbH & Co., Tuttlingen, Germany) with a vaginoscopic approach, without the use of a speculum or tenaculum forceps [18,19]. Metroplasty was performed through the 5 Fr working channel with a polyfibre (PolyFiber[™], IC, Biolitec, Milano, Italy) connected to a 980 nm Biolitec Ceralas HPD laser device (Biolitec AG, Vienna, Austria). The power was set at 20 W using a continuous mode. Uterine distension was achieved by using an automatic pump with saline solution at a pressure of 60–70 mmHg (Hamou Endomat, Karl Storz GmbH & Co.). Intraoperative pain was assessed using a VAS intensity rating from 0 to 10 (0 being no pain and 10 being unbearable pain).

For hysteroscopic metroplasty, based on our experience in this specific field, we adopted the following three “diagnostic” anatomy- and physiology-related criteria [20]:

- (1) *Colour of the cut tissue*: A septum, due to its fibrotic nature, will appear as a whitish tissue while the myometrium will be pinkish, due to its muscle fibres.
- (2) *Vascularization*: A septum, due to its fibrotic nature, has no vessels until the border with the myometrium is reached at which point some convoluted vessels appear.

- (3) *Sensitive innervation*: The procedure is performed without any analgesia or anaesthesia. Due to its fibrotic nature, a septum has no sensitive innervation. Sensitive terminations, physiologically located in the myometrium, start to be present when the first myometrial fibres blend with the collagen tissue of the septum. Therefore, the onset of pain during cutting is indicative of the presence of muscle fibres.

Considering the above criteria, we assumed that their presence, while cutting the supposed septum, would clearly indicate if the structure we were incising was a true septum (whitish, non-vascularised, and not painful on incision) or the wall of a bicornuate uterus (pinkish, vascularized, and painful if cut). The septum was cut and coagulated by contact with the fibre laser progressively, starting from the proximal part, equidistant from the anterior and the posterior walls, while carefully evaluating the three criteria. The septum incision, in the presence of whitish, non-vascularised tissue and without evident discomfort for the patient, was performed until at least 2 of the criteria became apparent. This obliged us, in all cases, to leave a fundal notch, no longer than 0.5–1 cm, at the end of the procedure. The procedure was considered complete when the operator visualized the first pole-pink myometrial bundle (Fig. 1). The operating time was determined from the introduction into vagina until complete septum resection. At the end of the examination, an assistant recorded whether the procedure was correctly performed and monitored each patient for at least 1 h, evaluating blood pressure, heart frequency, the pain score provided by each patient and side effects observed during the procedure. Post-operatively, patients received sequential oral contraception for 2 months. A second look hysteroscopy (Bettocchi[®] hysteroscope 5 mm) was performed on all patients two months after the hysteroscopic metroplasty to check for the presence of intra uterine adhesences or partial persistence of the septum [21]. No antibiotic prophylaxis was administered in either procedures [22]. Pregnancy outcomes within the first year after the procedure were investigated by contacting all patients by telephone and the responses were recorded.

Results

Characteristics of patients are reported in Table 1. Operating time was $13,16 \pm 1,33$ min. Blood loss during the procedure was minimal. There were no intraoperative complication. Intraoperative pain was $3,05 \pm 0,72$. No side effects were observed in any patients. Office hysteroscopy follow-up performed two months after the hysteroscopic metroplasty confirmed complete removal of the

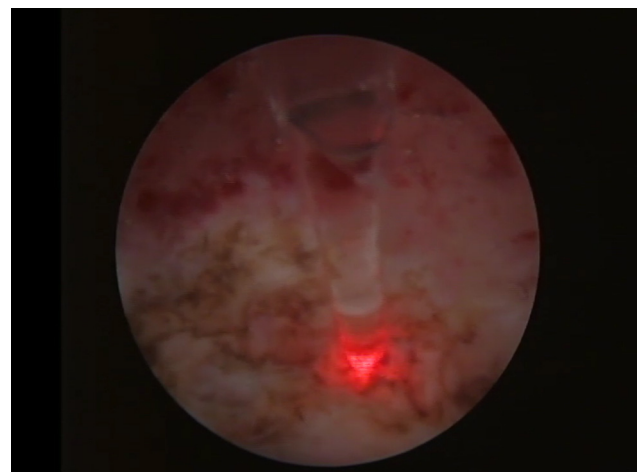


Fig. 1. Hysteroscopic metroplasty with diode laser.

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