

## Mechanical Versus Unipolar Hysteroscopic Removal of Endometrial Polyp before Intracytoplasmic Sperm Injection: Review Article

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### ABSTRACT

**Background:** Endometrial polyps (EPs) are stromal and endometrial gland hyperplastic growths. Both premenopausal and postmenopausal women have a lack of apoptotic regulation and an increase of oestrogen and progesterone receptors. An embryonic age-synchronized receptive endometrium is necessary for successful implantation. By specific mechanisms, EPs impair endometrial receptivity and implantation. Because a polyp delays the hormonal response that an endometrium in good health ordinarily elicits, implantation is put at risk. Additionally, when EPs are present, a different set of endometrial markers participate in the decasualization, implantation, and trophoblast invasion processes. **Objective:** The study's goal was to evaluate the results of endometrial hysteroscopic polyps' removal surgery via the unipolar electrodes versus mechanical (scissor) under hysteroscopy.

**Conclusion:** Both compared mechanical and unipolar were safe and effective in hysteroscopic removal of endometrial polyp. The mechanical hysteroscopic removal was preferable in terms of operative time, polypectomy time and pain tolerance. Mechanical hysteroscopic removal non-significantly improve the clinical pregnancy.

**Keywords:** Hysteroscopic, Endometrial polyp, Implantation, Unipolar electrodes, Pregnancy.

### INTRODUCTION

The most common pathological finding in the uterus is endometrial polyps, which are often benign overgrowths. Although the actual prevalence of endometrial polyps is unknown, it was shown that 82% of the women with polyps had no symptoms. Half of all occurrences of abnormal uterine bleeding are caused by endometrial polyps <sup>(1)</sup>. The endometrial polyp is a focal hyperplasia of the basal endometrial originating as a localized tumor and is covered by glandular epithelium. Histologically, it is recognized as glands that behave in a different manner composed of fibrous stroma and vessels with thickened walls <sup>(2)</sup>. The endometrial polyp can grow throughout both the reproductive and postmenopausal stages and can range in size from 5 mm to completely occupying the uterine cavity. It typically develops in the fundus and is frequently in the corneal area, where curettage removal presents obvious technical challenges. It can occur at any age, but is most common in women between the ages of 40 and 49 <sup>(3)</sup>.

Transvaginal ultrasonography (TVUS), the gold standard for diagnosing endometrial polyps, reveals them as a hyperechogenic lesion with regular outlines. It's possible to see cystic glands inside the polyp. For uterine diseases in general and uterine polyps in particular, hysteroscopy offers a superior diagnostic value <sup>(4)</sup>. In the event that a polyp is found prior to the stimulation of in vitro fertilisation or a cycle of frozen embryo transfer, the majority of specialists advise hysteroscopy and polypectomy. However, there is inconsistent clinical information about the effectiveness of various care approaches during cycles of assisted reproductive technologies. Contrary to a mechanical effect, which would be predicted to be stronger in the presence of larger polyps, there is no correlation between polyp size and fertility outcomes <sup>(5)</sup>.

### Epidemiology

Endometrial polyps can develop at any age, but their prevalence is highest in women between the ages of 40 and 49. Between 20 and 40% of reproductive-aged women with abnormal uterine bleeding are thought to have endometrial polyps <sup>(6)</sup>. In about 10% of women, endometrial polyps are discovered after autopsy. Compared to postmenopausal women, premenopausal women had a lower risk of developing malignant endometrial polyps <sup>(7)</sup>.

### Etiology and pathogenesis

Both estrogen receptors (ERs) and progesterone receptors (PRs) have been reported to be present in endometrial polyps, and it has been discovered that the concentration of both receptors is significantly higher in the glandular epithelium of endometrial polyps compared to the normal epithelium. Endometrial polyp stromal cells' ER and PR concentrations have been found to be decreased, which may hinder the polyp's stroma from going through the same decidual alterations and menstrual shedding that the rest of the endometrium does <sup>(8)</sup>. Exogenous and endogenous oestrogen administration are risk factors for the development of endometrial polyps. Endometrial polyps are more likely to form when taking the breast cancer medication tamoxifen, which is a uterine oestrogen agonist <sup>(9)</sup>. Tamoxifen has oestrogenic effects on the uterus, and endometrial polyps, hyperplasia, and cancer were more common in users than in non-users. Histologically, polyps in tamoxifen users are different from those in non-users. According to **McGurgan et al.** <sup>(10)</sup> the administration of Tamoxifen causes these polyps to have lower ER and higher PR levels while also having lower levels of apoptotic cells.

### Histopathology

Endometrial polyps are endometrial proliferations made up of connective, fibromuscular, glandular, and vascular components. Endometrial polyps have a predominantly vascular core and are superficially primarily covered by epithelial tissue. The three types of polyps are sessile, pedunculated, and prolapsing. Areas of squamous metaplasia, infection, or ulceration may be present in a prolapsed polyp. Most endometrial polyps differ from the surrounding endometrium and do not react to cyclical hormonal changes. There may also be atrophic, hyperplastic, or carcinomatous histological features <sup>(11)</sup>.

### **Clinical characteristics**

The majority of polyp lesions are benign, although a tiny proportion can exhibit abnormal or malignant characteristics. The basic classification approach divides polyps into two groups: present and absent, as determined by ultrasound and hysteroscopic imaging alone or in combination with or without histology <sup>(12)</sup>.

### **Diagnosis**

Between menarche and menopause, 9–14% of women experience abnormal uterine bleeding, which sharply reduces quality of life and raises the cost of living. Examining teenage endometrial tissue is advised by the American College of Obstetrics and Gynecology (ACOG), older women with suspected anovulatory bleeding who are under the age of 35, and women who are not responding to medical treatment to rule out cancer. Hysteroscopy and ultrasonography are unable to accurately discriminate between benign and malignant polyps <sup>(13)</sup>.

The initial imaging method of preference is transvaginal ultrasonography (TVUS), with MRI saved for ambiguous instances or situations where sampling is challenging. Uterine polyps are seen on ultrasound as ovoid, echogenic lumps that extend into the endometrial lumen, with a feeding artery visible on Doppler ultrasound <sup>(14)</sup>.

The American Association of Gynecologic Laparoscopists (AAGL) proposed the following recommendations in 2012 for the identification of endometrial polyps: (1) When possible, TVUS should be the investigation of choice because it provides trustworthy information, (2) The ability to diagnose endometrial polyps is improved by the addition of intrauterine contrast sonography (with or without 3D imaging), (3) Blind dilatation and curettage or biopsy should not be utilised, and (4) The addition of colour or power Doppler improves TVUS's capacity to detect endometrial polyps <sup>(15)</sup>.

### **Hysteroscopic polypectomy and myomectomy**

Abnormal uterine haemorrhage, infertility, and repeated miscarriages are indications for polyp removal. Depending on the patient's symptoms and the endometrial polyp's potential for cancer, endometrial polyps can be treated surgically or expectantly <sup>(16)</sup>.

Blind polyp removal or curettage, direct visualisation and removal utilising hysteroscopic scissors and

grasping forceps, monopolar or bipolar resectoscopes, or hysteroscopic mechanical tissue removal devices are some examples of surgical resection approaches. Over blind techniques, direct hysteroscopic removal of polyps is favoured, which are linked to erroneous intrauterine lesion diagnosis and inefficient removal <sup>(15)</sup>.

### **Electrosurgery resecting loops**

The need for cervical dilatation and either regional anaesthesia or general anaesthesia is the main disadvantage of using big diameter resectoscopes. The loop is stretched beyond the focal lesion, much like when resecting submucous fibroids. Then, either by using the trigger to close the loop, moving the entire resectoscope, or using a combination of both, it is activated and moved closer to the operator. . Endometrial polyps are significantly simpler to remove than submucous fibroids because they are softer and less vascular. They are quickly removed, either in pieces after a few sweeps away from the resecting loop or in one piece after one sweep at the base of the polyp where it joined to the uterine side wall <sup>(17)</sup>. When the extended loop is closed to mechanically separate the polyp from its attachment, the inactivated loop can occasionally be used as a straightforward snare. Compressible, glandular polyps are frequently removed from the previously dilated cervical canal under vision by enclosing the tissue inside the hysteroscope's withdrawn loop and end, then pulling the entire apparatus along the cervical canal <sup>(18)</sup>.

### **Electrical resection with miniature electrodes**

The bipolar electrode's cutting point operates by vaporisation. The saline is boiled to form a vapour pocket by high-temperature heating close to the active electrode. Because blood vessels are cauterised, bleeding is reduced as a result. The Versapoint™ electrodes, which were created to be utilised with a special small-diameter operative hysteroscope, were the first bipolar tiny electrodes. The "Alphascope™," formerly known as the "Versascope™," is a small-diameter, semi-rigid hysteroscope with a rotating cuff to control how the bipolar electrodes and other auxiliary equipment are oriented after being put into the expandable disposable outer sheath. However, any normal continuous flow working 30 hysteroscope with a 1.6 mm operating channel may accommodate the bipolar electrodes, making them incredibly flexible devices <sup>(19)</sup>.

The necessity for traumatic cervical dilatation is reduced when smaller diameter electrosurgical operating setups are used instead of formal resectoscopes. One of the key breakthroughs that helped move polypectomy into an office setting was the Versapoint™ electrode, which was created as a more powerful cutting instrument than the flimsy mechanical graspers and scissors. A conventional rigid operational hysteroscope's operating channel is traversed with the bipolar electrode once a polyp has been identified.

However, it is advised to place the Alphascope into the uterine cavity without the electrode in the operating channel if utilising the device with an expanding plastic working channel<sup>(20)</sup>.

### Scissors and grasping forceps

Similar tools to those mentioned above can be used to separate endometrial polyps through the process of cold scissor resection. Scissors offer the advantages of being reusable and not producing bubbles that could impair the field of vision. Although delicate, they eventually become blunt, and are challenging to control. Unlike the bipolar electrodes, they cause bleeding and are unable to remove further fibrous polyps<sup>(21)</sup>.

### Tissue removal systems

The earlier section on submucous fibroids included descriptions of the TRUCLEAR™ and Myosure™ tissue removal systems. Uterine polyps can be removed using these technologies. Polyps contain softer tissue than submucous fibroids, making them susceptible to morcellation with equipment that have less cutting force (Myosure REACH, LITE & CLASSIC). The OD TRUCLEAR system, offered by TRUCLEAR, comprises a device with a substantially smaller diameter and a 2.9 mm rotary cutting blade. The continuous flow system has an outside diameter of 5.6 mm and helps with visualisation even when there is a lot of tissue debris and bleeding<sup>(19)</sup>. In a recent RCT, TRUCLEAR tissue removal was found to be quicker, less painful, and more effective than Versapoint electrosurgery for eliminating endometrial polyps in the office<sup>(22)</sup>.

### Impact on Fertility

Endometrial polyps may negatively affect fertility through a variety of methods, including mechanical disruption of sperm transport or interference with embryo implantation by space-occupying lesions. Progesterone stimulation fails to stimulate the glands and stroma in endometrial polyps, which results in poor implantation at the polyp's location. Local inflammatory changes brought on by endometrial polyps may potentially interfere with normal implantation and fetal development<sup>(23)</sup>. Mast cells are more prevalent and there are more matrix metalloproteinase-2 and metalloproteinase-9 present in the uterine cavity, are the mediators of these inflammatory alterations. Glycodelin, a glycoprotein produced by endometrial polyps, has been demonstrated to block the action of natural killer cells, making the endometrium less susceptible to implantation<sup>(24)</sup>. HOXA10 and HOXA11, two established molecular indicators of endometrial receptivity, are thought to be decreased by endometrial polyps<sup>(25)</sup>.

### In vitro fertilization

The majority of recent studies favour removing endometrial polyps before IVF cycles start. The success rates of the IVF cycle do not appear to be impacted by the interval between the hysteroscopic polypectomy and the subsequent cycle. However, there is ongoing debate regarding how to treat newly discovered endometrial

polyps during ovarian stimulation<sup>(26)</sup>. Removing newly discovered endometrial polyps during COH has been proven to reduce pregnancy loss rates, increase clinical pregnancy rates, and increase the number of live births in certain trials, but not in others<sup>(5)</sup>. One of the initial trials divided 83 people into two groups who had polyps less than 20 mm found after ovarian stimulation<sup>(27)</sup>. While the second group (34 patients) underwent hysteroscopic polypectomy right after egg retrieval, the first group (49 patients) underwent IVF with fresh embryo transfer. In a subsequent round, the frozen cryopreserved embryos were thawed and transplanted. There were no differences between the two groups' pregnancy rates. The aforementioned conclusions have been supported by a research<sup>(28)</sup>.

These results show that endometrial polyps less than 20 mm can be treated in new IVF-ET cycles without affecting clinical pregnancy rates or live delivery rates. The implantation, clinical pregnancy, and live birth rates following recent IVF-ET cycles were analysed, and it was determined that there was no difference between those with newly detected endometrial polyps and those with normal endometrial stripes<sup>(29)</sup>.

Our team has found that following fresh IVF cycles, fresh (20 mm) endometrial polyps discovered during ovarian stimulation have a higher biochemical pregnancy rate without having an adverse effect on clinical pregnancy or live birth rates. Thus, it is conceivable to hypothesise that tiny endometrial polyps may provide an environment unfavourable to an embryo's early growth. The risk of subsequent miscarriage, however, is mostly associated with embryonic aneuploidy or other endometrial variables if the embryo is able to overcome this initial setback<sup>(26)</sup>.

### Endometrial factors affecting implantation

#### Endometrial thickness:

Transvaginal ultrasound measures endometrial thickness (Eth), which is the maximum distance between the myometrial and endometrial echogenic surfaces in the plane perpendicular to the uterine body's central longitudinal axis. When using ART, an endometrial thickness of less than 7 mm is regarded as unsatisfactory. A triple line appearance or multilayered endometrium on the day of the ovulation trigger is classified as Grade A or responsive in terms of EnP and ER, whereas a homogeneous appearance or nonmultilayered endometrium is classified as Grade C or nonreceptive. Changes in the endometrium are brought on by progesterone secretion, and they manifest as a homogeneous character close to the junctional zone and a well defined central echogenic line. Grade B is assigned to this EnP on the day of the ovulation trigger<sup>(30)</sup>. Because crucial processes including trophoblast invasion and angiogenesis are dysregulated as a result of endometrial genetic anomalies, implantation failure might result.<sup>(31)</sup>

### CONCLUSION

Both compared mechanical and unipolar were safe and effective in hysteroscopic removal of endometrial polyp. The mechanical hysteroscopic removal was preferable in terms of operative time, polypectomy time and pain tolerance. Mechanical hysteroscopic removal non-significantly improved the clinical pregnancy.

#### Declarations:

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