Best Practice & Research Clinical Obstetrics and Gynaecology 29 (2015) 920–929

Contents lists available at ScienceDirect

Best Practice & Research Clinical Obstetrics and Gynaecology

journal homepage: www.elsevier.com/locate/bpobgyn

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Hysteroscopy and the treatment of uterine fibroids

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Keywords:
fibroids
submucous myomas
hysteroscopy
hysteroscopic surgery
resectoscopy
hysteroscopic morcellation

Fibroids or (leio)myomas are benign tumours that very commonly derive from smooth muscle cells of the myometrium. They are the most common indication for a hysterectomy. However, in women desirous of preservation of their uterus or of their fertility, a myomectomy may be a more appropriate form of surgical therapy. The submucous variant is often associated with heavy menstrual bleeding or subfertility. It can be removed with hysteroscopic surgery. Refinements of hysteroscopic surgical techniques have resulted in a better ability to remove submucous myomas.
The state of the art of such hysteroscopical techniques and instrumentation to treat submucous myomas and what has been proven is discussed.

Introduction

With the introduction of minimal-access surgical techniques like hysteroscopy, the ability was created to remove intrauterine disorders selectively with great patient satisfaction and important advantages to both the patient and the surgeon. In such cases, a hysterectomy can be prevented, and this is of extreme importance especially for women who wish to retain their fertility.

Patients consult the gynaecologist for complaints of heavy menstrual bleeding. Approximately one-third of these patients have an intrauterine disorder (submucous myoma or endometrial polyp) [1]. After diagnosing such an intrauterine disorder by ultrasonography or hysteroscopy, surgical removal is often scheduled.

Hysteroscopy is the process of viewing and operating in the endometrial cavity from a transcervical approach. The basic instrument is a long, narrow telescope connected to a light source to illuminate the area to be visualised. With a patient in the lithotomy position, the cervix is visualised and the distal end of the telescope is passed into a cervical canal, and, under direct visualisation, the instrument is

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http://dx.doi.org/10.1016/j.bpobgyn.2015.03.014
1521-6934/

advanced into the uterine cavity. A camera is attached to the proximal end of the hysteroscope to broadcast the image onto a video monitor. Given their safety and efficacy, diagnostic and operative hysteroscopy have become standards in gynaecological practice. Over the past few decades, refinements in optic and fiberoptic technology and inventions of new surgical accessories have dramatically improved visual resolution and surgical techniques in hysteroscopy [2]. Many hysteroscopic procedures have replaced old and/or invasive techniques like dilatation and curettage and hysterectomy.

Fibroids or (leio)myomas are benign tumours that very commonly derive from smooth muscle cells of the myometrium. They are the most common indication for a hysterectomy. However, in women desirous of preservation of their uterus or of their fertility, a myomectomy may be a more appropriate form of surgical therapy. In 1976, Neuwirth and Amin [3] reported five cases of excision of the submucous variant with a hysteroscopic control. The above-mentioned refinements of hysteroscopic surgical technique have resulted in a better ability to remove submucous myomas with the preservation of the uterus. The state of the art of such hysteroscopical techniques and instrumentation to treat submucous myomas is discussed.

Diagnosis and preoperative evaluation

To address the absence of consensus about the nomenclature of causes for abnormal uterine bleeding, the Fédération Internationale de Gynécologie et d'Obstétrique (FIGO) has designed the PALM-COEIN (polyp, adenomyosis, leiomyoma, malignancy and hyperplasia, coagulopathy, ovulatory disorders, endometrial disorders, Iatrogenic causes and not classified) classification system [4]. This classification system categorises the submucosal variant of fibroids according to our publication of 1993 [5]: intracavitary myomas that are attached to the endometrium by a narrow stalk are classified as type 0; types 1 and 2 myomas require that a portion of the lesion is intramural, but with type 1 being $\leq$50% and type 2 >50%. The type 3 myomas are completely extracavitary but abut the endometrium. Type 4 lesions are intramural myomas that are entirely within the myometrium, with no extension to the endometrial surface.

During the last decade, transvaginal ultrasonography of the uterus has become a routine procedure in the diagnostic workup of several gynaecological problems. It has been demonstrated that a normal sonographic finding is very accurate for the exclusion of clinically significant intracavitary abnormalities [6]. Furthermore, this normal sonographic finding is very well reproduced in the hands of different examiners [7]. However, in the case of abnormal or inconclusive sonographic findings, diagnostic accuracy and reproducibility decline. To improve the image in these cases, sonographic examination using artificial uterine cavity distension was first described at our department [8]. Saline infusion sonohysterography (SIS) is extensively described in the literature [9–11]. It is accepted that SIS improves the diagnostic accuracy of transvaginal ultrasonography in case of abnormal or inconclusive findings, and that SIS is an effective early diagnostic step in the evaluation of patients with premenopausal and postmenopausal abnormal uterine bleeding. The only contraindications are pregnancy and pelvic infection. Although the visualisation of the uterine cavity and its linings improves significantly, patients experience inconveniences and discomfort due to either fluid leakage whilst using a catheter without a balloon or pain with the use of a balloon catheter. In trying to overcome these disadvantages and to create a more stable filling of the uterine cavity, we modified the technique of SIS by instilling gel instead of flushing or infusing saline. This new technique and first experiences of gel instillation sonohysterography (GIS) were described [12–14]. Three-dimensional (3D) and four-dimensional ultrasound images can be achieved with a stable and adequate distension of the uterine cavity. This can only be achieved by the use of a gel. We have adopted the term virtual hysteroscopy for such type of imaging. Further improvement of ultrasound technology and computer processing will create images revealing diagnostic information that is equally accurate as diagnostic hysteroscopy with comparable or less pain and/or inconvenience for the patient.

For an adequate preoperative evaluation of a submucous myoma, it has been proven that a concomitant 3D contrast ultrasonographical examination has low interobserver and intraobserver variability with a good reproducibility of measuring the protrusion of the fibroid into the cavity [15]. Apart from properly classifying the intramural extension of the myoma, particularly the evaluation of the thickness of the myometrium between the intramural portion of the myoma and the serosa is important to prevent perforation during a hysteroscopic treatment. There are no generally accepted limits of this thickness although a minimal of 5 mm is often mentioned. Further, the surgeon should