SUBMUCOUS MYOMAS—DIAGNOSIS AND THERAPY

Version 1.0
Aim and target group

This draft standard protocol aims to use critically reviewed scientific research to make recommendations concerning the diagnostic and (chiefly hysteroscopic) therapeutic approach to submucous myomas. Principles of minimal invasiveness both in diagnosis and in the treatment and prevention of complications are also considered.

Procedure

This subject came up at the Witte Raaf meetings (consensus meetings of gynaecologists interested in endoscopy) on 7 and 8 March 2002 and 13–14 March 2003. The draft standard protocol was reviewed in accordance with the AGREE instrument. The recommendations made have been classified into classes A1, A2, B, C, or D in accordance with the NVOG Guideline Production Manual [1] based on the level of scientific evidence available.

Design of the literature search

No publications about this specific subject were found in the Cochrane Library or in the Cochrane Register of controlled studies. There was indeed a review article about the role of GnRH analogues in the treatment of myomas in general. In addition, a PubMed search (1966–2002) was carried out in Medline. The databases were searched using relevant MESH terms, including all subheadings, in combination with the use of the following key terms: comparative study, diagnosis, diagnostic imaging, endometrium, endoscopy, female, humans, hysteroscopy, leiomyoma, magnetic resonance imaging, methods, minimally invasive, myoma, pathology, predictive value of tests, premenopause, submucous myoma, surgery, surgical procedures, treatment outcome, ultrasonography, uterine hemorrhage, uterine neoplasms, and uterus. Cross-references were also searched for—albeit non-systematically—in Medline journals and in journals not forming part of the Medline database.

1 Description of the problem

In the event of abnormal blood loss, in particular heavy menstrual blood loss, it is chiefly submucous myomas that appear to be involved. Diagnostic and therapeutic options have burgeoned over the last decade; the approach to submucous myomas and bleeding disorders in premenopause has improved greatly. Over-treatment—e.g. extirpation of the uterus in the case of menorrhagia as a result of a small pedunculated submucous myoma—can thereby be prevented. New (minimally invasive) treatment methods give rise, however, to specific problems. Consequently, protocols need to be devised for these techniques.

2 Analysis of the available knowledge

2.1 Definition; classification

Leiomyomas are benign growths in the muscle of the uterus. They can be classified according to location in the uterine wall:

- submucous: lying under the mucosa and protruding into the cavity of the body of the uterus
- subserous: lying under the serosa and protruding towards the abdominal cavity
- intramural: lying in the uterine wall.

Submucous myomas may also be further classified into types 0–II, known in the literature as the ESGE classification (ESGE: European Society of Gynaecological Endoscopy, previously the ESH classification), which indicates the degree of intramural extension (see figure 1) [2]. Although other sub-classifications are used, this classification is the one applied most often internationally, due to the therapeutic consequences (see 2.5) [3].
2.2 Epidemiology
Myomas can manifest clinically in 25% of cases [4]; asymptomatic myomas are described in 20–70% of all women (and in well over 80% of black women) [5].

Myomas occur almost exclusively in women of reproductive age, with a progressive increase over the age of 40. Globally, myomas are the most common indication for a hysterectomy: in Australia, accounting for 21.7% [6], in the USA, 27% [7], and in Finland, 50% [8]. In the various studies, an insufficient distinction is made, however, according to the location of the myomas. In the literature, risk factors are listed for the occurrence of myomas (positive family history, black ethnicity, radiation) and for the growth of myomas (nulliparity, obesity) but these are not specific for the submucous location and to some extent have not yet been sufficiently researched.

Figure 1
ESGE classification of submucous myomas based on intramural extension.
Type 0: 0%, type I: < 50%, type II: >50% (borrowed with the consent of the ASRM: Fertil Steril 2000).

2.3 Symptomatology
There is the impression that, in myomas, the submucous forms are over-represented, despite the fact that these are the type that occur least frequently (5–10%). As a result of diagnostic shortcomings, we do not, however, know enough about the actual prevalence of submucous myomas, and the proportion of those in the overall symptomatology. In the literature, the figures cited vary from 7.8% to 29.9% [9–11]. Most authors do not, however, make a distinction between patients who are referred to their hospital in the first instance from primary care when abnormal uterine blood loss occurs and patients referred by colleagues in secondary care. As the latter group comprises a highly selected population, it is indeed important to make this distinction. In the group referred from primary care, a total prevalence of submucous myomas of 14.7% (n = 675) is found [3].

2.3.1 Abnormal uterine blood loss
Of women with more than 200 ml of menstrual blood loss, 40% have myomas [12]. Only in the group referred from secondary care are more submucous myomas found in women with menorrhagia than in women with metrorrhagia [3]. Although it is sometimes asserted that bleeding problems in the case of myomas are specifically associated with a submucous location, this is contested by others [13]. For example, recent studies showed that, in patients in whom a hysterectomy took place in connection with uterine myomatosis and menorrhagia, submucous myomas were found in only 40% [14]. We know little about the causal link between myomas and blood loss. Possible explanations include enlargement of the surface area of the cavity of the body of the uterus and venous stasis due to compression, which might explain why myomas other than submucous myomas can cause bleeding.

2.3.2 Dysmenorrhoea
Secondary dysmenorrhoea has been shown to be specifically associated with submucous myomas. In the case of dysmenorrhoea, a significant over-representation of these myomas is found [3]. The contractions as a result of the tendency of the uterus to expel an intracavitary structure are viewed as the most important explanation for the symptoms of pain that occur [13].
2.3.3 Sub-fertility
No causal relationship between myomas and fertility disorders has ever been demonstrated, but it is tempting for many to regard a diagnosed submucous myoma in a woman with an unfulfilled desire to have children as a possible cause of her problem. Pregnancy figures are cited between 31% and 65% after myomectomy (by means of hysteroscopy or laparotomy), but no randomised studies have been carried out into this [13, 15]. It is striking that the results of hysteroscopy, laparoscopy, and laparotomy do not differ significantly [16]. Although it has been described that sub-fertility occurs in 27–40% of women with multiple myomas, other possible causes of the sub-fertility are also found in most cases [17]. A meta-analysis shows that only myomas with a submucous or intracavitary component are associated with a reduced likelihood of reproduction and that hysteroscopic treatment might well be advantageous in such cases [18].

2.4 Diagnosis
2.4.1 Curettage
Curettage should not be carried out to diagnose myomas but remain reserved as a method of obtaining endometrial tissue for histological assay if there are no local abnormalities [3, 17, 19].

2.4.2 Ultrasound
The sensitivity of transvaginal ultrasound to diagnose myomas averages 94% (range: 62–100%) with a specificity of 98% (PPV 82–90%, NPV 96–98%) [20–22]. For the diagnosis of intracavitary abnormalities, a likelihood ratio has been found of 0.04 in the case of a normal vaginal echo and 9.09 for an abnormal echo, in comparison with hysteroscopy as the golden standard [3]. Ever more diagnostic hysteroscopies and curettages could be avoided by using transvaginal ultrasound to exclude polyps, myomas, or malignant abnormalities (NVOG guideline 4, Abnormal blood loss in postmenopausal women, and 52, Diagnosis and treatment of menorrhagia [23, 24]).

2.4.3 Contrast-enhanced ultrasound
In the case of contrast-enhanced ultrasound, the uterine cavity is filled with NaCl 0.9% as a contrast medium before the ultrasound is carried out. This technique is also referred to as hysterosonography, or SiS (saline infusion sonohysterography). Depending on the logistical options, the examination can be carried out after an ultrasound or immediately after a hysteroscopy, using the distension medium used in that examination. In studies comparing different methods of intrauterine diagnosis, contrast-enhanced ultrasound has been shown to be more reliable than transvaginal ultrasound alone, and its predictive value is just as high as that of hysteroscopy. The reliability of vaginal ultrasound increases through the addition of water as a contrast medium [22, 25–28]. In a meta-analysis by de Kroon, the following data were found in this regard: sensitivity 0.95 (95% CI, 0.93–0.97), specificity 0.88 (95% CI, 0.85–0.92), and likelihood ratios: 8.23 (95% CI, 6.2–11) and 0.06 (95% CI, 0.04–0.09) [1]. In a study involving 52 women just before extirpation of the uterus (with histology as the golden standard), even in the case of an abdominal contrast-enhanced ultrasound, values of 100% were found for sensitivity, specificity, and positive and negative predictive values [21]. The added value of contrast-enhanced ultrasound over and above hysteroscopy lies in the fact that information can be obtained not just about the cavity of the body of the uterus but also about the uterine wall. Using this technique, the presence, size, and location of the myoma is easier to establish [29, 30], and operability and the likelihood of complications can be better assessed [3, 29]). Also, the distance between the myoma and the serosa can generally be effectively determined—this is an important piece of information preoperatively, in order to prevent perforation. In addition, the examination, if there is significant blood loss, is subject to less reduced visibility than in the case of hysteroscopy in an analogous situation. Finally, contrast-enhanced ultrasound is experienced as less painful than hysteroscopy [31], but it can be disputed whether this still applies in comparison with the vaginoscopic technique of hysteroscopy. There are no systematic studies into this, but the literature that is available suggests that the differences then disappear or might actually ‘tip’ in the other direction [2, 3].

2.4.4 Hysteroscopy
Many authors regard a diagnostic hysteroscopy as the golden standard for the diagnosis of the cavity of the body [32–34], but this examination has limitations (see 2.4.3, ultrasound with contrast medium). A number of studies show that, when the presence of submucous myomas is being determined, sensitivity, specificity, and the positive and negative predictive values of hysteroscopy do not differ significantly from those of ultrasound with contrast medium [20, 21, 31]; they are, however, lower in other authors: sensitivity 82% and specificity 87% [27].
2.4.5 Hysterosalpingography (HSG)
The suspicion of a submucous myoma commonly arises for the first time in particular in the case of a fertility examination when HSG is carried out. HSG, however, should not be recommended as a primary examination, due to the very low reliability in relation to intracavitary abnormalities: up to 32% false positive results have been described [35–38]. Furthermore, this examination has the further disadvantage of giving rise to a radiation load.

2.4.6 MRI
Although some people promote magnetic resonance (MRI) to diagnose submucous myomas, the limited availability and the costs of a routine scan will restrict use. Nonetheless, the use of MRI has been shown to be better in terms of accurately determining the size of the myoma and the degree of intramural extension [26]. An MRI should therefore be considered in the case of complex, minimally invasive procedures (e.g. large, type-II myomas). Depending on availability, MRI can in any case be an alternative if ultrasound with contrast medium fails or is contraindicated.

2.4.7 Puncture biopsy
It is possible both transvaginally and transabdominally, on the basis of the ultrasound, to carry out a preoperative histological examination of a myoma to differentiate between adenomyosis and sarcomas [39]. The question, however, is whether an early detection of adenomyosis provides so much added value that it justifies an invasive diagnostic procedure. This also applies mutatis mutandis to sarcomas: at least in the premenopause, these occur very rarely. Furthermore, there is also the theoretical possibility that tumour cells may be disseminated though the puncture. This form of diagnostic procedure is also not very popular.

2.4.8 Colour and pulsed Doppler ultrasound
Doppler ultrasound enables blood perfusion patterns to be determined in organs in the small pelvis [40]. Some suggest that adenomyosis and sarcomas can be differentiated from myomas on the basis of various perfusion indices [41], but that has not been confirmed in later studies. There is no consensus concerning methodology.

2.4.9 Three-dimensional ultrasound
The opportunities afforded by three-dimensional ultrasound appear promising. There is no evidence to date in the literature, however, for significant added value in comparison with the techniques referred to above. We know that the human brain itself is already able to provide the stereometric representation that the newer ultrasound devices suggest. In a study on endometrial polyps, both three-dimensional ultrasound and three-dimensional contrast-enhanced ultrasound were shown to have higher specificity than the comparable two-dimensional techniques (69.5% vs 88.8% and 94.1% vs 100%, respectively); the two-dimensional contrast-enhanced ultrasound, however, was found to score even better than three-dimensional conventional ultrasound [42]. For submucous myomas, no comparative data are yet available, however.

2.5 Therapy

2.5.1 Hysteroscopy
The most commonly used treatment of submucous myomas is hysteroscopic transcervical resection (TCRM). In the literature, success rates of 71–96% are cited for the treatment of menorrhagia [3, 15, 43–45]. The likelihood that one treatment is sufficiently effective has been shown to be highly dependent on the degree of intramural extension: type 0: 96%, type I: 74%, type II: 67% (n = 93, 2–8 year follow-up) [44]. The deeper the myoma in the myometrium, the greater the chance of an incomplete resection and the greater the likelihood of needing to repeat the procedure: from 0% in the case of type 0 to 36% in the case of type II [3]. There are also indications that, even after an incomplete resection (via spontaneous regression or resorption of myoma tissue), the symptoms can abate: in one study, this occurred in up to 66% of the cases [46] (it is not clear from the article whether there is a maximum proportion of the myoma that can be left behind). Furthermore, success is partly dependent on the possible presence of other myomas, which increase the likelihood of the problem recurring. There are indications that TCRM is most successful in uteruses of normal size with no more than two submucous myomas and that this treatment would probably have to be limited to this group [3]. A discussion of the likelihood of recurrence in these instances should in any case be recommended. Also, for each myoma, the size that hysteroscopic removal permits is likewise limited: usually, a maximum of 4–5 cm is considered achievable [2, 45]. If the diameter is greater, drug pre-treatment can be considered to try to bring the myoma to within these bounds (see 2.6). If the myoma is submucous, TCRM is obviously the least invasive approach.
2.5.2 Myoma enucleation, embolisation, extirpation of the uterus
In the literature, there is consensus concerning the fact that myoma enucleation, embolisation, and extirpation of the uterus can be considered over-treatment in the case of relatively small submucous myomas [47]. These therapeutic options are reserved for cases in which the myomas are too large or do not respond to the pre-treatment. An extensive discussion of these falls outside the scope of this guideline, as they are not specific for the submucous location.

The submucous location, for some researchers, is a (relative) contraindication for embolisation, due to the likelihood of necrosis in the cavity of the body of the uterus with risk of expulsion, and probably a greater chance of sepsis [48, 49]. For all forms of surgical myoma treatment where the patient would still like to have children, the potential consequences for pregnancy should be considered, such as rupture of the uterus and also, in theory, placenta accreta or increta. There is no systematic research available about this; there are only anecdotal reports [50, 51].

2.6 Precautions in relation to therapy
All of the precautions are connected with one or more of the chief complications that should be avoidable if such precautions are taken: intravasation, infection, perforation, and bleeding.

2.6.1 Drug pre-treatment
When TUR (transurethral resection) syndrome occurs (see below), the duration of the procedure and the location of the myoma have been shown to be the most important risk factors [3]. Even though the surgeon’s expertise obviously plays an additional role (if only in as far as this affects the speed of the procedure), this has never been researched. Other authors also cite the size of the myoma, but there is probably a correlation with the duration of the procedure in this instance too, in fact an exponential one: the removal of tissue is linked to the volume of the myoma; for the relationship between the volume and the radius of a (spherical) myoma, the formula 4/3 πr³ obviously applies. Preoperative drug therapy can reduce the size of the myoma scheduled for removal. Although many drugs have been researched, in practice only GnRH analogues have been shown to cause myomas to shrink to a significant degree, with values ranging between 30% and 70%, if these drugs are administered for the 3–4 months prior to surgery [52–27]. No distinction was made in these studies as to location of the myomas, and no endoscopic procedures were included, but it seems possible to extrapolate some of the results to submucous myomas and TCRM. An additional advantage in the preoperative administration of GnRH analogues is the correction of any anaemia that might be present. During the operation, there is reduced blood loss [58–60].

There are no prospective randomised studies available, however, that show the effect of GnRH reduction specifically on submucous myomas. Retrospective studies furthermore do suggest such an effect [61–63].

In the case of submucous myomas with a diameter of less than 3 cm, in one study no additional advantage was found of pre-treatment either for the patient or the surgeon [64]. The question of the extent to which preoperative myoma reduction using drugs is always necessary cannot effectively be answered, based on the literature available to date. It is possible that the usually altered consistency of the myoma is advantageous, even if the diameter remains the same.

Contrary to what one would expect, the addition of tibolone to treat vasomotor symptoms (add-back therapy) has been shown not to have any adverse effect on myoma reduction [65, 66].

Also, an unfavourable location, e.g. in the uterine horn, is viewed by some as an indication for pre-treatment, to prevent perforation [64].

In view of the high costs and side effects of GnRH analogues, it makes sense to determine indications and restrict administration to this selected group.

On the basis of the above, premedication should be considered in the case of the following [67]:

- sub-fertility
- myomas with a diameter of 4 cm or more
- an adverse location in the cavity of the body of the uterus, e.g. in the uterine horn
- anaemia due to bleeding disorders
- type-II myomas.

These indications apply all the more if they occur in combination with each other. For the future, it should be possible to consider establishing a scoring system in which the indications can be handled in a weighted manner.
2.6.2 Distension media and instruments

• Distension medium

In the case of TCRM with hypotonic distension media (sorbitol, glycine, etc.), there is a consensus concerning the need to use a system that makes it possible to measure the quantity of distension medium flowing in and out as a measure of the quantity of intravasation, to prevent fluid overload [68].

There is no systematic research into this. In the meantime, systems have been developed that operate using bipolar electrical current, which has the advantage that isotonic fluid can be used to this end. Although the safety margins as regards intravasation are then greater, it is desirable nonetheless to monitor fluid load, particularly if there are cardiopulmonary risk factors [69].

The consequences of intravasation can be subdivided into volume load, which can occur in the case of excessive infusion with all media, and electrolyte imbalances, if the medium is not isotonic. The latter can lead to TUR syndrome, which was first described in the case of transurethral resection [70]. The disruption in electrolyte imbalance caused by the intravasation of non-isotonic, non-conductive fluids as a distension medium can potentially cause serious organ damage.

A linear relationship has been shown between the intravasation of electrolyte-free (non-isotonic) fluid and the occurrence of hyponatraemia: an approximately 1 mmol/L reduction in Na per 100 ml loss, with cerebral oedema furthermore shown to be visible on a CT scan after a loss of just 500 ml [3, 71, 72].

The consequences of hyponatraemia are:

- 120–125 mmol/l: malaise, nausea, headache
- 110–120 mmol/l: headache, lethargy, confusion
- < 110 mmol/l: strokes, delirium, coma (beware of hypokalaemia: arrhythmias)

Based on an average value of 140 mmol/l for Na in the population, an Na level of < 125 mmol/L corresponds to an approximately 1500 ml loss [3]. Determining osmotic concentration is probably a better measure of the degree of electrolyte imbalance [73].

For the maximum acceptable loss of electrolyte-free distension fluid, the arbitrary thresholds set out below can probably be used. The WGE (Gynaecological Endoscopy Working Group) achieved a consensus about this in 2002, which is consistent with that of German-speaking countries [68], and the guidelines of the American Association of Gynecologic Laparoscopists (AAGL) [74], the American College of Obstetrics and Gynecology (ACOG) [69], and the Scottish Royal College of Physicians [75].

> 500 ml

- intensification of preoperative alertness and monitoring
- possible administration of mannitol 20% [74]

> 1000 ml

- aiming at the termination of the procedure (max. 1500 ml intravasation)
- administration of diuretics (e.g. furosemide, 20–40 mg)
- administration of NaCl 2.5% on the basis of electrolyte assays

In order to be able to determine this loss of rinsing fluid, an automatic pump system should be used, which determines the pressure and the flow rate and continuously indicates the quantity of medium flowing in and out. It is equally unclear from the literature what the optimal form of anaesthesia is. On one hand, regional analgesia through vasodilatation can increase the likelihood of intravasation, but on the other hand the first symptoms of hyponatraemia thereby become evident more quickly than in the case of general anaesthesia. As bipolar systems (that have the great advantage that NaCl 0.9% can be used as a distension medium) are used in only a few hospitals at the moment, just the monopolar systems are discussed in this guideline. On the basis of the favourable experiences in these hospitals, however, it should be anticipated that this guideline will need to be adjusted in this regard in due course. The ACOG advises accepting a maximum loss of 2500 ml NaCl 0.9% [69]. There are no results of clinical studies concerning this, however.
• Perforation

The likelihood of perforation probably rises as the distance of the myoma from the serosa of the uterus falls. In the literature, an arbitrary safe threshold of 8 mm is cited [76]. As this distance reduces, more caution or alertness is required, and carrying out the procedure under laparoscopic guidance or ultrasound monitoring can be considered. In the case of perforation, it is advisable to terminate the procedure and restart it later, unless there is a suspicion of intestinal injury, in which case laparoscopy and sometimes even laparotomy in cases of doubt are suitable [69, 75].

2.6.3 Antibiotic prophylaxis

The incidence of infection in the case of hysteroscopic operations is higher than in the case of diagnostic procedures but is still very low [77]. In the case of TCRE (transcervical resection of the endometrium), the usefulness of antibiotic prophylaxis has been studied and has not been shown effective in preventing clinically manifest infections, although there was a significant reduction in the occurrence of bacteraemia (2% vs 16%) [78]. With reference to this latter, somewhat paradoxical effect, the possibility cannot be excluded that if the study population had been larger, a significant difference would indeed have been found in the prevention of infections. The question is whether these data can simply be extrapolated to apply to TCRM; the fact that the wound surfaces are smaller does not, however, suggest that the risks, in this instance, would be much greater. On the other hand, there are a number of anecdotal reports of serious, sometimes fatal infections, on the basis of which some practitioners have indeed carried out antibiotic prophylaxis [79, 80]. Recommending antibiotic prophylaxis on this basis and on the basis of a reduction in bacteraemia should be considered until more clarity is achieved regarding how useful this measure is, certainly if the patient would still like to have children. This is also consistent with the RCOG (Royal College of Obstetricians and Gynaecologists) guideline concerning menorrhagia, which likewise tends towards recommending antibiotic prophylaxis in the case of hysteroscopic procedures on the basis of extrapolating data from research on hysterectomies [47]. In a consensus discussion between gynaecologists with an interest in endoscopy in 2002, this recommendation was endorsed.

2.6.4 Measures to control bleeding

Bleeding is a rare complication of TCRM: 0.25–0.4% [50, 81], although some report values up to 2.4% [69]. In a Dutch study in 100 hospitals, this complication was found in 0.75% of the cases [77]. To prevent postoperative bleeding after TCRM, if indicated (severe blood loss persisting after the natural uterine contractions have been awaited immediately after the procedure), a 30 ml Foley balloon catheter or an intrauterine balloon specially developed to this end (Cook intrauterine stent) is applied, 6–12 hours after the procedure, to tampon the wound bed [82]. Tranexamic acid (Cycloapron) 500–1000 mg intravenous is known to be able to reduce postoperative blood loss, but there is little data available in the literature on its use in TCRM. The ACOG suggests possible intracavitary use of this drug, but without further references [69].

2.7 Expertise and training

In relation to the necessary expertise for the treatment of submucous myomas, refer to the Final Attainment Specifications for the Core Gynaecology Package drawn up by the NVOG Gynaecology Council. The recommendations contained therein suggest that TCRM of small type-0 and type-I myomas are viewed as part of the basic package but that type-II myomas and / or large myomas should be treated by gynaecologists with additional training and experience.

3 Minimum required care and core recommendations

3.1 Diagnosis

For the diagnosis of submucous myoma and before surgery, intrauterine diagnosis using ultrasound or hysteroscopy is vital.

3.2 Therapy

Hysteroscopic treatment of submucous myomas is preferable, unless they are too large or numerous, in which case abnormalities falling outside the core package (according to the final attainment specifications for trainee gynaecologists) should be treated by a gynaecologist with supplementary training and experience.
4 Conclusions and advice

4.1 Diagnosis

1. In cases of submucous myomas, transvaginal ultrasound is currently the best and most commonly used first-line imaging technique (B).

2. For more precise diagnostic imaging, particularly if conventional ultrasound is insufficient and in order to prepare sufficiently for surgery, the addition of physiological salt as a contrast medium (contrast-enhanced ultrasound) is recommended (B).

3. Diagnostic hysteroscopy is nearly as effective for these purposes (B) and has the advantage that there is plenty of evidence for the fact that it is an effective examination technique for the straightforward determination and exclusion of intrauterine abnormalities (B).

4. MRI, as an alternative, is generally less available, but it is more reliable specifically for submucous myomas than contrast-enhanced ultrasound and hysteroscopy and can be carried out preoperatively if certain treatments are indicated (B).

4.2 Therapy

1. Submucous myomas no larger than 4 cm should preferably be removed hysteroscopically (B).

2. In the case of larger myomas, preoperative reduction is possible with GnRH analogues (A2); pre-treatment with these drugs should be considered also in the case of other risk factors (type II, unfavourable location, anaemia, sub-fertility) (B).

3. In the case of two or more myomas, an increased likelihood of recurrence should be discussed, and surgical therapy other than hysterectomy can be considered (C). If the patient would like to have children, the more intramural the location of the myoma, the more caution is required (and the indication is accordingly weaker) (B).

4. If, in the case of resection of myoma, a hypotonic distension medium is used, an automatic pump system is recommended that accurately monitors the difference between the volumes of fluid flowing in and out. The aim of this is to limit the loss to 1000 ml (and in any case not to tolerate more than 1500 ml) (D). If the loss of medium is rising, additional mannitol, NaCl 2.5%, and / or a diuretic can be administered (C).

5. Antibiotic prophylaxis is advisable (C).

6. In the case of serious postoperative blood loss, intrauterine tamponade with balloon catheter can be considered (D).

7. Hysteroscopic surgery under laparoscopic or ultrasound guidance is rarely necessary but can be considered if indicated (D).
References


