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SURGICAL SHORTCUTS

Recent literature with comments

Comparison between two commonly used bulking agents for female stress urinary incontinence

Cross-Linked Polydimethylsiloxane Injection for Female Stress Urinary Incontinence: Results of a Multicenter, Randomized, Controlled, Single-Blind Study

Ghoniem G., Corcos J., Comiter C., Bernhard P., Westney O.L., Herschorn S. (2009) Journal of Urology, 2009; 181: 204–210.

Purpose: In a pivotal trial we evaluated the effectiveness and safety of Macroplastique® as minimally invasive endoscopic treatment for female stress urinary incontinence primarily due to intrinsic sphincter deficiency.
Methods: A total of 247 females with intrinsic sphincter deficiency were randomized 1:1 and treated with a transurethral injection of Macroplastique or Contigen®. The latter group served as the control. Repeat treatment was allowed after the 3-month followup. Effectiveness was determined 12 months after the last treatment using Stamey grade, pad weight and Urinary Incontinence Quality of Life Scale scores. Safety assessment was recorded throughout the study.
Results: After 12 patients were excluded from study 122 patients received Macroplastique injection and 125 received Contigen injection. Mean patient age was 61 years and the average history of incontinence was 11.2 years. Of the patients 24% had undergone prior incontinence surgery. At 12 months after treatment 61.5% of patients who received Macroplastique and 48% of controls had improved 1 Stamey grade. In the Macroplastique group the dry/cure rate was 36.9% compared to 24.8% in the control group ($p<0.05$). In the Macroplastique and control groups the 1-hour pad weight decrease was 25.4 and 22.8 ml from baseline ($p=0.64$), and the mean improvement in Urinary Incontinence Quality of Life Scale score was 28.7 and 26.4 ($p=0.49$), respectively.
Conclusions: Macroplastique injection was statistically more effective than Contigen for stress urinary incontinence primarily due to intrinsic sphincter deficiency with a 12.1% cure rate difference. Macroplastique can be administered on an outpatient basis. It should be considered a primary or secondary treatment option for stress urinary incontinence.

COMMENTARY

Urethral bulking agents offer an alternative, minimally invasive approach for the surgical management of female stress urinary incontinence (SUI). Whilst in general offering lower efficacy rates than mid-urethral tape procedures they remain useful in women with significant co-morbidity and may be performed under local anaesthesia in the office setting. Traditionally they have also played an important role in treating women with intrinsic sphincter deficiency (ISD).

Until relatively recently there has been a paucity of data to support the use of the products which are currently used and whilst there have been previous studies comparing collagen to Macroplastique, Coaptite, and Durasphere these were small studies with short term follow up. Consequently both the Cochrane Collaboration and the International Consultation on Incontinence (ICI) conclude that they may be useful in carefully selected patients although the evidence is limited.

This prospective multicentre randomised controlled study compared Macroplastique (Polydimethylsiloxane) to Contigen (Collagen) in 247 women with SUI and diagnosis of ISD. The fact that recruitment took over 3 years in 12 sites indicates just how difficult it can be to perform prospective adequately powered surgical studies. Importantly patients were assessed using a multidimensional approach comprising objective (pad test), subjective (Sta-

mey grade) and Quality of Life (QoL) measures (I-QoL). All procedures were performed transurethrally under local or general anaesthetic using an endoscopic approach rather than the minimally invasive Macroplastique Implantation System (MIS) with repeat treatment at 3 months if required.

At 12 months the dry/cure was significantly higher in the Macroplastique arm when compared to the Contigen arm (36.9% vs 24.8%; $p<0.05$) as was the improved rate (61.5% vs 48%; $p<0.001$) whilst QoL improvement was similar in both groups. In addition there was no difference in re-treatment rates between the two agents.

This study is important as it represents a well designed appropriately powered head to head comparison between two commonly used bulking agents. Contigen was one of the first bulking agents to be launched and for many years has been the most commonly used substance in North America. Conversely Macroplastique has been widely used in Europe and is known to have and excellent safety record. The results of this study would imply that the efficacy of Macroplastique is significantly better in terms of cure and improvement when compared to Contigen. In theory Macroplastique also has the theoretical advantage of a minimally invasive implantation system (MIS) which can be performed in the office without the need for cystourethroscopy and since it is synthetic there is no need for a skin test prior to treatment.

The importance of well conducted clinical trials with adequate safety evaluation in the development of bulking agents is illustrated by the recent withdrawal of two of the agents on the market. Tegress (ethylene vinyl alcohol co-polymer) was associated with urethral erosions whilst Zuidex (hyaluronic acid/dextranomer co polymer) was associated with urethral pseudocyst formation.

An evidence based approach, and careful patient selection, should allow clinicians to maximise the clinical efficacy of the use of bulking agents in the management of female SUI whilst reducing morbidity and this in turn should lead to an improvement in patient satisfaction.

Dudley Robinson, London, UK

Predicting the presence of pelvic adhesions

Diagnosis of pelvic adhesions in patients with endometrioma: the role of transvaginal ultrasonography

Guerriero, S., Ajossa, S., Garau, N., Alcazar, J.L., Mais, V., Melis, G.B. Fertility and Sterility 2009 in press

Objective: To estimate the diagnostic value of transvaginal ultrasonography in the detection of pelvic adhesions in women suspected of having endometriomas at ultrasonography.

Design: Prospective observational study. Setting: Academic Department of Obstetrics and Gynecology. Patient(s): One hundred thirteen women who underwent surgery for an endometrioma. Intervention(s): All patients underwent transvaginal ultrasonography before surgery, and at ultrasonography the presence of fixation of the ovary to the uterus was considered characteristic of the presence of pelvic adhesions. Main Outcome

Results: The sensitivity and specificity of the fixation to the uterus of at least one ovary were respectively 89% (95% CI 84%–92%) and 90% (95% CI 76%–97%). The likelihood ratio for fixation of at least one ovary to the uterus was 8.92 (95% CI 3.04–26) and for a "normal" ultrasound examination 0.12 (95% CI 0.06–0.23). The pretest probability of pelvic adhesions was 74%, and this probability increased to 96% when fixation of at least one ovary to the uterus was present and fell to 27% when this ultrasonographic finding was absent.

Conclusion: Transvaginal ultrasonography seems to be able to detect or exclude the presence of adhesions in women with ultrasonographic suspicion of endometrioma.

COMMENTARY

In this study, Guerriero et al evaluated the role of transvaginal ultrasonography in predicting pelvic adhesions in women with endometrioma. They concluded that the evolution of the fixation of the ovary to the uterus should be introduced in the presurgical evaluation of patients with endometriomas.

Endometriosis is an inflammatory disease, usually associated with pelvic adhesions of variable severity. The preoperative evaluation of adhesions is quite difficult to obtain. Gynaecologists are usually aware of severe pelvic adhesions in cases of deep infiltrating endometriosis affecting the rectum or the recto-sigmoid junction.

However, in cases of ovarian endometriomas, at laparoscopy, different situations can be observed such as:

- no adhesions between the ovary and the broad ligament,
- fixed ovarian endometrioma to the broad ligament,
- severe adhesions with the uterus or the controlateral ovary
- severe adhesions with the rectum or the sigmoid.

Preoperative transvaginal ultrasonography routinely performed, aimed to determine the size of the endometrioma. It's role in predicting the presence of pelvic adhesions is quite new and could be of interest for laparoscopic surgeons, specially if it could detect adhesions with the rectum or the recto sigmoid.

The study conducted by Guerriero et al was a prospective observational study but we do not know if this study was a blind study. Indeed the echographists are well identified but, on the contrary, no details are given concerning gynaecologists performing the surgery.

At laparoscopy, on the 113 women with ovarian endometrioma, 74% have been found to have pelvic adhesions. Adhesions involved the rectum sigmoid in 20 women, and the retro cervical area in 38 women. Deep endometriosis was observed in 40 women and occlusion of the pouch of Douglas in 32 women. These results revealed that isolated ovarian endometriomas is a rare situation. Indeed, ovarian endometriomas are often associated to other localisations of endometriotic lesions which have to be removed at the same time.

As conclusion, the authors claimed that their approach may be useful in the selection of different therapeutic options, surgical or medical. We have to keep in mind that the first approach of painful endometriosis should be surgical as medical treatment is ineffective on adhesions. We agree that the prediction of severe adhesions should be of interest for the gynaecologists who will perform surgical removal of endometriomas and associated adhesions.

In summary, in this manuscript, the authors demonstrated that ovarian endometriomas are often associated with deep infiltrating endometriosis and that preoperative transvaginal ultrasonography could let the surgeons to suspect severe adhesions and relative difficult surgery.

Their recommendation to evaluate the ovarian fixation to the uterus has implication for clinical practice. I would rate this article as interesting and recommendable reading. It could let gynaecologists to suspect other localisation of endometriotic lesions and also the presence of adhesions responsible for more difficult surgery than simple cystectomy as usually described for ovarian endometriomas.

Nevertheless, the echographic criteria of ovarian fixation should be detailed more deeply and further studies should be performed in order to confirm these preliminary results.

Michelle Nisolle, Liège, Belgium

Adenomyosis is an incidental finding

Determinants of adenomyosis in women who underwent hysterectomy for benign gynecological conditions: Results from a prospective multicentric study in Italy

Parazzini, F., Mais, V., Cipriani, S., Busacca, M., Venturini, P. European Journal of Obstetrics Gynecology and Reproductive Biology 2009; 143:103–106

Objective: We conducted a cross-sectional study on the frequency and risk factors for adenomyosis in women who underwent hysterectomy for benign gynecological conditions.
Study design: All women who consecutively underwent hysterectomy during the study period for benign gynecological conditions at 18 gynecological departments were eligible for the study. A total of 820 women entered the study. Pathological data were collected prospectically.
Results: Adenomyosis was identified in 231 women (28.2%, 95% confidence interval, CI, 24.6–32.5). The frequency of adenomyosis was similar in women with indication for surgery fibroids/menorrhagia (143 cases, 28.5%) or genital prolapse (69 cases, 28.2%). The rate ratio of adenomyosis was 1.9 (95% CI 1.2–2.8) in women reporting one or more induced abortions, in comparison with those reporting no induced abortion. Women with adenomyosis reported more frequently dysmenorrhoea and chronic pelvic pain, but not dyspareunia.
Conclusions: This study shows that adenomyosis is common in women who undergo hysterectomy and that it is more frequent among women reporting induced abortions dysmenorrhoea and chronic pelvic pain.

COMMENTARY

The true incidence of adenomyosis in women of fertile age remains undetermined, although it has been estimated at between 6% and 10% of all women, and at 35%–50% of women with pelvic pain and infertility [01].

Unfortunately, a direct assessment of the frequency of adenomyosis is not feasible because there is no agreed classification or definition of what constitutes adenomyosis in its mild forms [02]. In addition, whereas data from the literature suggest that it may be related to abnormal bleeding and chronic pelvic pain, it can be asymptomatic; therefore a clinical diagnosis is not feasible. Finally, no screening procedure exists; it was hoped that the use of Vaginal Sonography (VS) might improve the situation, but—whereas in the hands a skilled operator VS can identify the presence of frank adenomyosis [03]—the procedure cannot be applied for a generalized screening in the female population of fertile age. Better results can be obtained with Magnetic Resonance (MR) imaging a procedure providing an accurate picture of the myometrium and of the presence of endometrial foci within it [04]. In addition, it has been proposed that a diagnosis of adenomyosis can be posed if an MR indicates that the thickness of the myometrium Junctional Zone exceeds 12 mm [05]. Even accepting that MR provides an accurate diagnosis a generalized screening is still not possible, because the procedure is costly and time-consuming.

Given this reality, incidence of adenomyosis has been only indirectly calculated; a recent publication by Parazzini and collaborators addressed the only two questions for which an answer is possible: its frequency in non-malignant situations where hysterectomy is deemed necessary in view of the severe symptomatology; and the existence of specific determinants.

Their work presents the largest series so far published comparing women with and without adenomyosis and

therefore can correctly be considered the best available evidence. Adenomyosis was identified in 231 specimens, representing 28.2% of the total. In the two groups the frequency of symptoms was similar with and without evidence of adenomyosis. No statistically significant difference in the frequency of the condition was found in women hysterectomized for fibroids, menorrhagia and, genital prolapse or for the presence of endometriosis.

The data from Parazzini and collaborators must be considered in the light of results recently published by Weiss et al. [06] who made a direct comparison of the frequency of indications for surgery in 137 perimenopausal women, 48% of whom had adenomyosis. In these women, no statistically significant difference was found between women with and without adenomyosis when the indication for hysterectomy was fibroids (37% versus 43%); endometriosis (3% versus 5%); abnormal bleeding (27% versus 33%) or chronic pelvic pain in the presence of fibroids (12% versus 17%).

Interestingly enough, both these recent observations failed to find any connection between adenomyosis and endometriosis, another highly controversial issue: indeed, whereas Kunz *et al*. [07], found a prevalence of adenomyosis in 70% of women with endometriosis, compared to 9% in healthy controls, an older study by Bazot *et al.* [04] reported that only 27% of women with pelvic endometriosis had adenomyosis on pre-operative MR imaging.

It is unfortunate that Parazzini and collaborators were not able to provide information on whether the clinical, surgical and histopathological diagnosis, coincided or not. In conclusion, the information published by Parazzini et al. seems to confirm the opinion of Weiss et al. [06] that "adenomyosis is an incidental finding, not the source of the symptomatology", for which hysterectomy is performed.

Giuseppe Benagiano, Roma, Italy

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Surgical training in gynaecology

Fialkow M.F., Goff B.A.

Training the next generation of minimally invasive surgeons. J Minim Invasive Gynecolog 2009:16.136–141

A paradigm shift is occurring in the educational approach to surgical procedures. A variety of pressures are forcing the initial education of surgeons of all disciplines out of the operating department and into simulation. Fortunately, increasing evidence suggests that surgeons can learn many fundamental skills and specific procedures with simulators. Evidence also supports the expectation that surgeons trained in simulation laboratories initially perform better in the operating department than those who are not. Minimally invasive procedures lend themselves to simulation particularly well. Currently, many different models are available for training and improvement in skills are seen with both low- and high-fidelity models. Developing an effective curriculum principally requires a commitment to the concept, and the time and space, for residents to learn and practice. Although many questions remain about how to optimally apply and evaluate the educational tools being developed, it appears certain that surgical simulation, in some form, is the educational paradigm of the present and future.

COMMENTARY

Fialkow and co-workers address surgical training in gynaecology. The well structured and well written article contains a—non systematic—review of the literature on

simulation and a description of their own training program. The article is strongly recommended to any gynecologist who is involved in a resident training program. The bottom line is that there is a current shift from lecture based didactics and service related training to simulation outside the operating room. Why is this so important? Practicing surgery by residents in the OR may increase the number of surgical errors during the procedure and the complication rate as well. Thus the OR is not the blame free environment that is needed for an effective learning curve. Moreover the learning curve requires additional OR time and especially in the OR, time is money. The reduced working hours of residents affect the resident's exposure to surgery and therefore the required case load to achieve proficiency. Simulation as a way to overcome these shortcomings of conventional surgical training has been studied extensively. Although the quality of the articles is not all that high, it is well accepted that simulation with video training (conventional tower), virtual reality and in the animal lab improves the skills of the trainee more effectively than conventional training does.[1] Some new concepts are unfolded in the article. One of them is the increasing awareness that one or more training courses with extensive training within a short period will have less effect on the learning curve than interval training on individual basis during a longer time. Repetitive training in surgery is as important as in other fields of excellence such as music and aviation. This underlines the need for training facilities in all hospitals where surgeons in training perform surgery. Another important issue for the trainee is the need for objectively established goals that have to be reached within a certain time frame. By giving access to the next level of surgery according to the result of the objective structured assessment of technical skills (OSATS) or of the so called 'metric' criteria in virtual reality training such as the number of errors and path length, an incentive for regular training is created. As the main problem of simulation in surgery is to motivate both trainees and supervisors to participate, the incorporation of simulation training in the resident training program is of paramount importance. Besides the consciousness that the surgical learning curve can partly be completed without patients being involved, two practical requirements must be met: first the residents need the time to practice in the lab and training activities should therefore be scheduled in order to prevent the training from interfering with patient care. Second, the 'paradigm shift' from training on the job to simulation requires investing by the hospital board in dry labs, video towers and instruments, virtual reality trainers and animal labs to implement this concept that is already well accepted as a major contribution to surgical quality.

Hans Brölmann, Amsterdam, Netherlands

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Magnetic resonance-guided focused ultrasound surgery (MRgFUS) for uterine fibroids

Rabinovici J, David M, Fukunishi H, Morita Y, Gostout and Stewart EA

Pregnancy outcome after magnetic resonance-guided focused ultrasound surgery (MRgFUS) for conservative treatment of uterine fibroids. Fertil Steril 2009 @ in press

Objective. To report all pregnancies to date after magnetic resonance-guided focused ultrasound surgery (MRgFUS) for the conservative treatment of clinically significant uterine fibroids.
Methods. Prospective registry of all known pregnancies occurring after MRgFUS maintained by the device manufacturer and reported to the Food and Drug Administration. Fifty-one reproductive-age women with uterine leiomyomas underwent MRgFUS treatment for symptomatic uterine leiomyomas before this report.
Results. Fifty-four pregnancies in 51 women have occurred after MRgFUS treatment of uterine leiomyomas. The mean time to conception was 8 months after treatment. Live births occurred in 41% of pregnancies, with a 28% spontaneous abortion rate, an 11% rate of elective pregnancy termination, and 11 (20%) ongoing pregnancies beyond 20 gestational weeks. The mean birth weight was 3.3 kg, and the vaginal delivery rate was 64%.
Conclusion. Preliminary pregnancy experience after MRgFUS is encouraging, with a high rate of delivered and ongoing pregnancies.

COMMENTARY

The article of Rabinovici and colleagues describes pregnancy outcome after a novel, non invasive treatment for uterine fibroids, magnetic resonance guided focused ultrasound surgery (MRgFUS) that may have some advantage over other treatments that conserve the uterus and consequently, fertility such as myomectomy and uterine artery embolisation (UAE).[1] It concludes that MRgFUS may be an appropriate treatment for sub-fertile women with fibroids and should be read by all interested in women's health.

MRgFUS results in thermal coagulation of fibroids rather than ischaemic necrosis as with UAE that contributes to many of the complications associated with the latter. MRgFUS is associated with a short recovery time, and a low complication

rate although the decrease in fibroid size is modest.[2,3] Myomectomy, the 'gold standard' treatment for fibroids, has the disadvantage of a small but significant incidence of major complications as does UAE thus there is as yet no ideal treatment for women wishing to retain their uterus.

Many fibroids are asymptomatic and their effect on fertility and pregnancy is far from clear.[4] The good pregnancy outcome reported here may result from selection bias since a majority of the women recruited into the studies of MRgFUS were parous and not seeking pregnancy. Only 1 group of unknown size was actively seeking pregnancy, the remainder being 'anecdotal'. To date, inclusion criteria have been extremely tight in regard to fibroid characteristics.[5] Expert opinion suggests that fibroids that are intra-cavity are those most likely to be associated with sub-fertility but these women comprise a minority of those included in this study with over 60% being intramural or sub-serosal. Also, as with studies involving UAE, most women are Caucasian in spite of the high prevalence of symptomatic fibroids in African-American women. Their exclusion may result from the presence of large, multiple fibroids that are not suitable for MRgFUS. Whether the data reported will apply to these women who are most in need of conservative treatment has yet to be determined. Although only 30% presented with infertility, of the nulliparous women achieving a successful pregnancy, 82% did so in less than a year which would suggest either a very dramatic impact of treatment or that the fibroids were not the major cause for any delay in conception. Other factors that might impair fertility are not reported

One very striking difference to uterine artery embolisation is the much lower caesarean section rate and apparently more favourable outcome for pregnancy. If this is the case for a wider group of women having MRgIUS then this finding will be of considerable significance.

This technical advance has definite potential that will only be determined when the inclusion criteria are extended to a wider range of the women who will benefit most.[5] Intuitively MTgFUS is a very attractive treatment for women with a small number of symptomatic fibroids that are intramural s. However, currently it is not available widely because of the expensive and sophisticated nature of the machinery required but it is definitely something that needs to be watched very carefully in the years to come and when results of the proposed trial in infertile women and also similar trials with UAE are published, it will be the time for a direct comparison.

May Anne Lumsden, Glasgow, Scotland

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Laparoscopic myomectomy is a feasible alternative

Laparoscopy vs. laparoscopically assisted myomectomy in the management of uterine myomas: a prospective study.

Yannis P., Ioannis K., Nikos P.
Am J Obstet Gynecol 2009;200:144.e1–144.e6.

Objective: This study was undertaken to compare the intraoperative and short-term outcomes between the 2 modalities of minimally invasive surgery for the management of uterine fibroids.
Methods: A total of 116 patients with inclusion criteria were prospectively collected in a study period from March 1997 through 2007. Laparoscopic (n=40) vs laparoscopically assisted myomectomy (n=76) were compared for the management of no more than 3 intramural or subserous uterine myomas, of a maximum diameter of 90 mm.
Results: The patients' characteristics by age, parity, body mass index, number and location of myomas were well balanced between the 2 study groups. The mean diameter of the myomas was the only characteristic significantly higher in the laparoscopically assisted myomectomy group. The operative time in the laparoscopically assisted myomectomy was significantly shorter compared with the laparoscopic myomectomy (mean±standard deviation: 66±[1] 19 min vs 94[1]±18, P<.0001). A shorter uterine incision was found in the laparoscopically assisted myomectomy technique compared with the laparoscopic myomectomy (2.9±[1] 0.6 vs 4.3±[1] 1.2, P<.0001). Estimated blood loss was significantly higher in the laparoscopically assisted myomectomy group (P=.002). Intraoperative, early postoperative complications, hospitalization days, and fully returned activity were similar between the 2 study groups.

Condlusion: The present data suggest that the laparoscopically assisted myomectomy is a valid alternative to laparoscopy in a setting of minimally invasive surgery for the management of uterine fibroids Key words: laparoscopic assisted myomectomy, laparoscopy, myomas, myomectomy

COMMENTARY

This study was undertaken to compare the intraoperative and short-term outcomes between Laparoscopic Myomectomy (LM) and Laparoscopic Assisted Myomectomy (LAM) for the management of uterine fibroids. Various parameters related to 116 surgical procedures were analyzed from 1997 through 2007 (LM: n=40 vs. LAM: n= 76). Data regarding the management of no more than 3 intramural or subserous uterine fibroids, of a maximum diameter of 90 mm is analyzed.

In evaluating the message of this article it is important to note that the mean diameter of fibroids removed was significantly larger in the LAM group (54 mm) as compared to the LM group (45 mm) [p<.0001] which may be considered as a built-in bias resulted from lack of blind randomization.

The operative time in the LAM group was significantly shorter as compared to the LM, and a shorter uterine incision was found in the LAM technique compared with the LM. This may lead to less adhesion formation. Estimated blood loss was significantly higher in the LAM group which may be related to the larger average size. Surgical complications, hospitalization days, and fully returned activity were similar between the two study groups.

The current study confirmed that LAM is a feasible alternative to LM in the management of uterine fibroids. The authors claim that uterus can be palpated to ensure that no small intramural myomas are left in the uterus, the operative time is decreased, and minimal electrocautery is required which may improve viability of remaining tissue.

LAM was introduced by Nezhat et al.[1] in 1994 as an alternative to laparoscopy and laparotomy in the management of uterine fibroids. Since then laparoscopic surgery underwent significant changes. New generations of surgical tools, better training,[2] simulation,[3] and accreditation programs[4] resulted in updated clinical classifications based on difficulty levels. One may agree that the LAM technique has a lower level of surgical difficulty; however, based on team work and surgical skills, an ongoing disagreement about inclusion/exclusion criteria for safe LM is expected.

Palpation of small fibroids during LAM is important in order to optimize surgical outcome and reduce recurrence rate. However, improved imaging technologies (high resolution 2D and 3D ultrasound, hydrosonography and MRI) combined with optimal surgical training may dictate patient's selection. Last, but not least, multidisciplinary uterine fibroid centers which offer various technologies to treat uterine fibroids including myolysis, medical treatments, uterine artery embolization, MR guided Focused Ultrasound and complimentary/integrative medicine may raise the controversy regarding the place of the surgical approach to a new level. Guidelines for patient's selection at such centers are under construction as technologies are improved and tested. This LM/LAM article is interesting and relevant in this context and may add valuable information for the construction of such guidelines, and can be considered by practicing surgeons.

Yona Tadir and Chen Goldchmit, Tel Aviv, Israel

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Uterine artery embolization is an effective minimally invasive option for symptomatic uterine fibroids

Park AJ, Bohrer JC, Bradley LD, Diwadkar GB, Moon E, Newman JS, Jelovsek JE

Incidence and risk factors for surgical intervention after uterine artery embolization. Am J Obstet Gynecol 2008;199:671.e1–671.e6.

Objective: To determine the incidence and risk factors for surgical intervention after uterine artery embolization for symptomatic uterine fibroids.
Methods: Electronic medical records of all patients who underwent uterine artery embolization for symptomatic uterine leiomyomata were reviewed. Logistic regression was used to identify independent risk factors for any surgical intervention and for hysterectomy alone after uterine artery embolization.
Results: Uterine artery embolization was performed in 454 patients during the study period, with a median follow-up time (range) of 14 (0–128) months. Overall, 99 patients (22%) underwent any surgical intervention after uterine artery embolization in the operating room. Risk factors for any surgical intervention included younger age (P<.003),

bleeding as an indication for uterine artery embolization ($P<.01$), presence of significant collateral ovarian vessel contribution to the uterus ($P<.01$), or use of 355–500 m particles ($P<.008$).

Conclusions: Patients undergoing uterine artery embolization have a 22% risk for requiring additional surgical intervention, but overall uterine artery embolization is an effective minimally invasive option.

COMMENTARY

The aim of this report is to identify factors which increase the risk of a surgical procedure being required after Uterine Artery Embolization (UAE).The surgical procedures include operative hysteroscopy, dilatation and curettage, myomectomy and hysterectomy. The report is based on a single centre's review of 10 years experience of 454 subjects undergoing UAE for symptomatic fibroids. They found that 22% of women required a further surgical procedure and factors increasing the risk of a surgical procedure were younger age, bleeding as the main symptom, the presence of ovarian collaterals supplying the uterus and small embolic particle size.

The rate of surgical intervention in this article is similar to the literature and is due to clinical failure with continued menorrhagia in 73%, pain in 34% and bulk symptoms in 7%. As the indication for UAE was menorrhagia in the majority of cases, it is not surprising that this is identified as a risk factor.

The exclusion criteria included women with significant adenomyosis. However, 26.7% of the hysterectomy specimens contained adenomyosis, presumably undetected prior to UAE, highlighting the importance of making this diagnosis before counselling patients about their treatment options and the increased risk of clinical failure in this setting.

Persistent vascular supply to the fibroids by inadequate embolization or the presence of collateral supply remains a problem. If collateral supply from ovarian arteries is identified, further embolization is an option. Inadequate embolization for a variety of reasons, is known to occur, and responds to a second embolization, which does not seem to have been offered. The fact that 2 out of the 13 interventional radiologists performed 61% of the UAE procedures implies that the other 11 were early in their learning curve, when technique related problems are more likely.

It is particularly interesting that the embolic particle size is identified as a risk factor. This might be less due to size than type of embolic particle. The size quoted (355–500 microns) suggests that this was a non-spherical particle in common use which has a tendency to form aggregates and instead of embolizing distally is more likely to cause a more proximal embolization. Spherical particles are upsized but tend to be carried further into the fibroid and peri-fibroid plexus as they do not form aggregates. The type of embolic particle used in UAE is the subject of much research and this could be an important finding. Unfortunately, the authors do not go into this in any depth and do not identify this as a focus for future research. Of the risk factors identified by this paper, this has the potential to be the most important one related to the technique.

The article confirms many of the findings reported in the literature and may have identified an important technique related risk factor, but more evidence for this is required.

Anna-Maria Belli, London, UK