Total and subtotal abdominal hysterectomy for benign gynaecological disease

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Abstract
In both the UK and USA, hysterectomy remains the commonest major gynaecological operation. It is the only definitive cure for dysfunctional uterine bleeding, and rates highest in satisfaction scores compared to other treatments, and improves quality of life. Conservative alternatives to hysterectomy, including endometrial ablative techniques, the Mirena Intrauterine System (IUS) and uterine artery embolization (UAE) for fibroids, have not greatly reduced hysterectomy rates. The majority of hysterectomies are performed by the abdominal route, fibroids being the most common indication. The overall mortality rate is 0.5–2/1000 and the rate of visceral damage is 0.5–2%. In both countries the majority are total, the subtotal procedure accounting for less than 5%. Recent research showed no major advantage for subtotal over total hysterectomy (or vice versa) in terms of pelvic organ function, although longer-term data are required to resolve issues on vault/cervical stump prolapse, and to establish whether the beneficial effects of both operations on bladder and sexual function persist long term. Research is required on abdominal versus vaginal hysterectomy in the absence of prolapse, and on why hysterectomy rates vary so widely between countries, and even between regions within the same country. Since fibroids remain the commonest indication for hysterectomy, research is also required to optimize conservative treatments such as UAE, focussed ultrasound surgery and myomectomy.

Keywords bladder function; bowel function; complications; quality of life; sexual function; subtotal abdominal hysterectomy; total hysterectomy

Historical perspectives
Early hysterectomies were all subtotal; the first ever recorded having been performed by Charles Clay in 1843. The first total hysterectomy is attributed to E H Richardson in 1929. From then on there was a gradual increase in the rates of total hysterectomy, until the 1940s, when the advent of antibiotics, blood transfusion, modern anaesthesia and improved surgical techniques emboldened surgeons to the point where total hysterectomy became the mainstay procedure. With the recognition that cancer occasionally developed in the cervical stump, subtotal hysterectomy became such an unpopular procedure that to this day it accounts for less than 5% of the total numbers of hysterectomies performed in the UK, and similar trends are observed in the USA. However, reports from Scandinavia in the early 1980s, the changing perspective of the risk of cancer in the cervical stump, the risk of bladder and ureteric injury and the prevailing litigious climate in medical practice, as well as patient demand and media interest, have forced gynaecologists to re-examine their negative attitude to subtotal hysterectomy.

The total versus subtotal hysterectomy debate
Hysterectomy disrupts the anatomical relationships and local nerve supply, and it has seemed reasonable to suppose that pelvic organ function might be adversely affected. Because subtotal hysterectomy minimizes the anatomic and nervous disruption, some have argued that it may ameliorate the potential adverse effects of total hysterectomy. The issue simmered in the background until a real debate was sparked off by a series of publications from Scandinavia in the early 1980s which suggested that subtotal hysterectomy conferred significant advantages over total hysterectomy with respect to bladder and sexual function. However, subsequent studies from the same institute did not concur with the original findings, the latter being criticized for their design and the patient selection.

The key issues in the debate were whether indeed subtotal hysterectomy conferred any benefits over total hysterectomy with regard to bladder, bowel and sexual function, as well as recovery and complication rates. The concern that cancer might develop in the cervical stump was no longer considered a justification for the routine use of total abdominal hysterectomy. Screening had been shown to reduce the incidence of invasive cancer, and the risk of cervical cancer after subtotal abdominal hysterectomy (in a woman who has always had normal smears) is now estimated at less than 0.1%. On the other hand, injury to the urinary tract, which occurs in 0.5–3% of hysterectomies, is the most frequent cause of litigation after total abdominal hysterectomy. Subtotal hysterectomy requires less mobilization of the bladder and minimizes the risk of injury to the ureters. It has also been suggested that subtotal hysterectomy is associated with lower rates of wound infection and haematoma, and certainly avoids symptomatic vault granulation.

Why hysterectomy could adversely affect pelvic organ function — anatomical and psychological considerations
Hysterectomy alters the relative anatomical spatial relationships among the pelvic organs, and disrupts their innervation. The pelvic plexus, of paramount importance in the coordinated contractions of the smooth muscle of the bladder and bowel, is formed by the junction of the pelvic parasympathetic and sympathetic nerves. This plexus is intimately related to the bladder, cervix and vagina and the nerve supply of the pelvic organs is derived from it. At total hysterectomy, the pelvic plexus

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may be at risk in four areas. Firstly, the main branches of the plexus passing beneath the uterine arteries may be damaged during the division of the cardinal ligaments. Secondly, the major part of the vesical innervation, which enters the bladder base before spreading throughout the detrusor muscle, may be damaged during blunt dissection of the bladder from the uterus and cervix. Thirdly the extensive dissection of the paravaginal tissue may disrupt the pelvic nerves passing from the lateral aspect of the vagina. Finally, the removal of the cervix will result in loss of a large segment of the plexus which is intimately related to it. The remaining portion of the plexus may be inadequate to deal with afferent impulses from the rectum and the bladder, possibly leading to bladder and rectal dysfunction. Disturbance of the innervation of the cervix and the upper vagina after total hysterectomy could also interfere with lubrication and orgasm. Loss of a major portion of the utero-vaginal plexus through excision of the cervix might have an adverse effect on sexual arousal and orgasm in women who previously experienced the so-called “internal orgasm”, thought to be triggered by cervical pressure. While women who achieve orgasm through clitoral stimulation might not be affected, and those who had experienced both types of orgasm or in whom sexual response was blended might note a decrease in sexual response following hysterectomy. Vaginal dryness due to a reduction in cervical mucus, and vaginal shortening, might also contribute to sexual problems.

From a psychological viewpoint, a variety of factors including cultural beliefs, education and women’s views on the role of the uterus may well influence how they will react to hysterectomy. The uterus has historically been regarded as the regulator and controller of important physiological functions, a sexual organ and symbol of youth and attractiveness. Removal of such an organ might therefore be expected to alter women’s perception of self, especially with regard to femininity, attractiveness, sexual desire and ability to respond sexually. This in turn affects quality of life and psychological parameters, important considerations since the vast majority of hysterectomies are performed to improve quality of life rather than to cure life-threatening disease.

Complications and recovery rates following hysterectomy

With total abdominal hysterectomy, much of the operative time, cost and morbidity are associated with the removal of the cervix. Compared to total, vaginal or laparoscopic hysterectomy, subtotal abdominal hysterectomy is undoubtedly a safer operation. There is less or no mobilization of the bladder, and minimal risk to the ureters. In the UK as well as the USA, injury to the urinary tract, estimated at between 0.5 and 3%, is the biggest cause of litigation following hysterectomy. Additional advantages of subtotal hysterectomy are that haematomas and wound infections are reported to be less common. The higher incidence of the latter associated with total abdominal hysterectomy is often attributed to contamination of the abdominal cavity by vaginal flora during the procedure. Vault granulations do not complicate subtotal hysterectomy, but they occur in 21% of women after total hysterectomy, even if polygalactide sutures are used, and they almost always cause symptoms.

But subtotal hysterectomy does have potential disadvantages too. Although the risk of cervical cancer after subtotal abdominal hysterectomy is very small, estimated at less than 0.1%, it cannot be ignored altogether. The incidence of cyclical bleeding after subtotal hysterectomy has been variably reported, and many women would be disappointed to find that they continue to menstruate even after having undergone major surgery. Even small amounts of residual endometrial tissue could result in abnormal bleeding, and complicate the use of hormone replacement therapy. Finally, there is uncertainty on the issue of vaginal vault versus cervical stump prolapse following abdominal hysterectomy. Although theoretically subtotal hysterectomy could decrease the incidence of post-hysterectomy prolapse of the vaginal vault by preserving connective tissue support of the upper vagina, earlier studies reported cervical prolapse following subtotal hysterectomy, and careful long-term follow up studies are required to resolve this issue.

Bladder function following hysterectomy

Although the issue of whether hysterectomy might adversely affect bladder function has been much researched and much debated, in reality most of the research has involved small numbers of patients, and until recently the issue had remained essentially unresolved. A recent systematic review of studies comparing the effects of subtotal abdominal hysterectomy and total abdominal hysterectomy on urinary function identified only three studies of sufficiently high methodological quality. Two were observational studies that showed an increased risk of incontinence among women who had undergone total abdominal hysterectomy. The third was a small randomized, controlled trial showing no advantages of one operation over the other.

Impact of hysterectomy on bowel function

Research on bowel function following hysterectomy had previously been no more revealing. Women often date the onset of bowel symptoms to previous gynaecologic surgery. However, bowel dysfunction is common among women with gynaecologic symptoms, even in the absence of surgery. Most studies of the effect of hysterectomy on bowel function have been retrospective, with small numbers of women and a lack of adequate controls. Some did not even define the type or route of the hysterectomy. A retrospective study of 593 women who had hysterectomy (abdominal, vaginal, radical and subtotal) against a control group of 100 women who had laparoscopic cholecystectomy found a significantly increased rate of bowel dysfunction in the hysterectomy group (3% versus 9%). No significant difference in incidence of bowel symptoms was noted in the different types of hysterectomy. It was also observed that in patients with changes in bowel function, changes in bladder function were observed more frequently \( p < 0.001 \) than in the group with no deterioration of bowel function after hysterectomy. Interesting though these findings were, nevertheless this was a retrospective study which depended on recall of symptoms going back over a 5-year period, and the validity of a comparison between hysterectomy and cholecystectomy patients is highly questionable.
A longitudinal study (by Gofeng et al) assessed bowel function preoperatively and at 3 and 11–18 months after hysterectomy. Detailed interviews enquiring about bowel function were performed along with rectal manometry and whole gut transit time. Anorectal physiology was normal after hysterectomy and no adverse bowel symptoms were noted except for a significant improvement in abdominal pain. There was no difference between total hysterectomy and subtotal hysterectomy. A prospective study designed to determine the incidence of symptoms suggestive of irritable bowel syndrome arising after hysterectomy concluded that hysterectomy had little if any effect on the de novo development of irritable bowel syndrome.

Influence of hysterectomy on sexual function

Since both physical and psychological factors have varying and unquantifiable influences, research on the human sexual response is complex. Psychological studies suggest that post-hysterectomy sexual function is influenced by a wide range of patient characteristics. For example, poor knowledge of reproductive anatomy, pre-hysterectomy negative expectation of sexual recovery following surgery, pre-operative psychiatric morbidity and unsatisfactory pre-operative sexual relations are all associated with poor outcome. Pre-hysterectomy factors that are associated with positive post-surgery sexuality include frequency of coitus, frequency of desire, and orgasmic response. In other words those women who retained an overall desire for sexual activity, and were presumably hampered by negative physical symptoms, might be expected to experience an improvement in their sexual function following hysterectomy.

Researchers in the Scandinavian studies of the early 1980s compared coital frequency, dyspareunia, libido and frequency of orgasm before surgery and at 6 weeks, 6 months, 1 year and 3 years post-surgery in 105 women who underwent total hysterectomy and 107 who had the subtotal procedure. Both groups showed an equal but slight reduction in coital frequency, dyspareunia decreased in both groups but statistically more in the STAH group; the frequency of orgasm was significantly reduced in the TAH group but not in the STAH group. However, subsequent studies from the same institute suggested that the negative effect of total hysterectomy on sexual function was not as great as originally perceived. As will be evident from a later discussion in this chapter this issue has now been largely resolved.

Quality of life and psychological sequelae of hysterectomy

Since in general hysterectomy and other treatments for menstrual disturbance are administered to improve quality of life rather than to cure life-threatening conditions, quality of life measurements should be an integral part of any evaluation of treatment modalities, and should be studied concurrently with clinical measures. Recent research presents compelling evidence that hysterectomy improves quality of life. Crosignani et al. reported improvement in quality of life using SF-36 in women after vaginal hysterectomy compared to endometrial resection, and Sculpher et al. compared abdominal hysterectomy and transcervical resection of the endometrium and also found an improvement in quality of life. Similarly, others have reported symptom relief following hysterectomy associated with marked improvement in quality of life. It is reasonable to suppose that women feel better because they no longer suffer the symptoms that meant they had to have a hysterectomy in the first place.

In general, recent research indicates hysterectomy does not predispose to adverse psychological sequelae, but that women with pre-operative depression are at increased risk for depression after surgery. This is consistent with the Maryland study, the largest prospective study to date of 1299 women, which reported a substantial decrease in depression and anxiety levels after hysterectomy.

Thus the consensus from most research evidence suggests that hysterectomy improves quality of life and psychological measures.

A resolution to the controversy surrounding total versus subtotal abdominal hysterectomy

In 2002 Thakar and her collaborators published in the New England Journal of Medicine a paper that was described in an accompanying editorial as the largest and most comprehensive randomized trial to date comparing the effects of total and subtotal hysterectomies (see Further reading). The description remains true. They tested the hypothesis that subtotal hysterectomy confers advantages over total hysterectomy. They conducted a prospective, randomized, double-blind multi-centre trial in which 279 women undergoing hysterectomy for benign disease were randomly allocated to total (n = 146) or subtotal (n = 133) hysterectomy. The main outcome measures were bladder, bowel and sexual function, post-operative recovery/ complication rates, and quality of life and psychological measures.

They found no significant differences between the two groups pre- and post-operatively in the important parameters of urinary, bowel and sexual functions. Following surgery fewer women in both groups had urinary frequency, nocturia, interrupted stream and incomplete emptying. On urodynamic assessment the first desire to void, strong desire to void and maximum capacity were significantly increased over time. Women with fibroids had a high urinary frequency pre-operatively, and a greater post-operative reduction in this symptom. Neither operation had an adverse impact on sexual function, and deep dyspareunia was significantly reduced in both groups post-operatively. Women in the total hysterectomy group stayed longer in hospital and had a higher incidence of pyrexia and antibiotic use. In the subtotal hysterectomy group, 7% developed cyclical bleeding and 2 women had cervical prolapse.

Thakar and her colleagues concluded that neither total nor subtotal hysterectomy adversely affects pelvic organ function. Indeed both may significantly improve aspects of bladder and sexual function. Subtotal hysterectomy appears to have early advantages with respect to recovery and complications, but is also associated with longer term cyclical bleeding and possibly cervical prolapse. They also corroborated the previous reports that hysterectomy improves quality of life and reduces psychiatric symptoms, and they found no advantage for one operation over the other. There have since been a further two publications from other researchers in Holland who have come...
up with much the same findings. Thus it could be claimed that the controversy of total versus subtotal hysterectomy has been resolved.

**Why hysterectomy, total or subtotal hysterectomy, does not adversely affect pelvic organ function**

The consistently high satisfaction rates reported in association with simple hysterectomy, and the recent findings in the study by Thakar and colleagues, suggest that major post-operative morbidity in terms of pelvic organ dysfunction is not a common occurrence after total or subtotal hysterectomy. More recent work by Butler-Manuel and colleagues provides a rational anatomical explanation as to why simple hysterectomy might not cause pelvic organ dysfunction. They showed that the nerve content of the uterosacral ligaments and cardinal ligaments differ along their length, with significantly greater nerve content in the middle to lateral thirds towards their origin at the pelvic side wall, compared with the medial third towards the insertion of these ligaments into the uterine body and cervix. During simple hysterectomy, the ligaments, and therefore the nerves within them, are divided very close to the uterus and cervix. Thus only the nerves innervating the uterus and cervix are interrupted, while those innervating the surrounding structures including the bladder and rectum remain intact. In contrast, radical hysterectomy, in which the ligaments are divided more laterally, has been associated with greater disturbance of pelvic organ function. This is also consistent with the observation that laparoscopic uterine nerve ablation (LUNA) for endometriosis and dysmenorrhoea does not adversely affect bladder function.

**Laparoscopic supracervical hysterectomy**

Details of the technique of total or subtotal hysterectomy are beyond the scope of this review. However, the advent of a variation in the technique – namely laparoscopic supracervical hysterectomy (LSH) warrants a brief discussion as it is likely to impact significantly on gynaecological surgery in the very near future, perhaps largely replacing the open hysterectomy procedure. LSH is a minimally invasive surgical method that should be regarded as an alternative to all other methods of total hysterectomy in benign conditions of the uterus like myoma, dysfunctional uterine bleeding and adenomyosis. It was developed in the 1990s and although prospective randomized controlled trials comparing LSH with other hysterectomies are sparse, its benefits compared to the open abdominal approach are well documented. The advocates of LSH claim that it is less invasive, easier to perform and carries a lower risk of uterine injuries and infectious complications compared to total laparoscopic hysterectomy, and the conventional open approaches of total or subtotal hysterectomy. It is associated with lower perioperative morbidity, rapid convalescence and shorter time to resume normal activity. It can also be performed on nulliparous patients, patients without any vaginal delivery and patients who had previous abdominal surgery. The more cautious are concerned with persistent risk of cervical stump symptoms such as vaginal bleeding and pelvic pain following LSH causing patient distress and eventually repeat surgery, but this risk is the same if the procedure is performed by the open route (provided similar measures are employed such as coring out the endocervix). Such concerns do not appear to be a significant issue where the open subtotal procedure is concerned.

In a retrospective analysis of 1706 consecutive patients undergoing SLH for benign gynaecological conditions, Boajahr and colleagues (2006) found that the mean duration of operation was 91.4 ± 33.3 min (95% CI 89.9–93.0) and mean duration of hospital stay was 2.15 ± 0.63 days (95% CI 2.12–2.18) and a very low rate of conversion to laparotomy (0.82%). The rate of intra-operative complications such as bladder or ureteric injuries and bleeding was 0.3% and that of post-operative complications such as bleeding from cervix and infection was about 1.2%. LSH is also thought to be associated with lower post-operative analgesia requirements, and further research has suggested that sexual and bowel functions as well as perception of body image after total laparoscopic hysterectomy and LSH are comparable. Some gynaecologists are even suggesting that due to the low complications rates LSH could be performed as a day care procedure.

**Conclusions**

Hysterectomy remains the only definitive cure for abnormal uterine bleeding, improving quality of life and rating highest in satisfaction scores compared to other modalities of treatment for dysfunctional uterine bleeding. The total versus subtotal hysterectomy debate has largely been resolved. In terms of counselling women needing a hysterectomy for a benign indication, they can now be reassured that neither total nor subtotal abdominal hysterectomy adversely affects pelvic organ function. Subtotal abdominal hysterectomy is easier to perform, with less risk of ureteric damage, but requires that women have regular cervical smears, and may result in cyclical bleeding in a small proportion of women. Laparoscopic subtotal hysterectomy may well overtake all other forms of hysterectomy for benign indication because of perceived safety, speed of recovery, minimal invasiveness and potential cost savings — rigorous research is required to firmly establish the place of LSH. Women should be provided with as much information as possible, and invited to participate in the decision-making about the type of hysterectomy they should have. Such empowerment may well improve satisfaction rates after surgery.

Key questions that require urgent resolution include the issue of the widely varying hysterectomy rates; whether indeed vaginal hysterectomy is advantageous over abdominal hysterectomy and if so, how gynaecologists can be encouraged to adopt this approach; the relevance of conservative surgical approaches to the management of menorrhagia; and optimal management of uterine fibroids, since the latter are currently the commonest indication for hysterectomy.

**FURTHER READING**


**Practice points**

- Hysterectomy is the only definitive cure for dysfunctional uterine bleeding.
- Hysterectomy rates highest in satisfaction scores compared to other treatment modalities for dysfunctional uterine bleeding.
- Hysterectomy improves quality of life, and decreases adverse psychological sequelae.
- The vast majority of hysterectomies are performed by the abdominal route, despite indications that the vaginal route might be more advantageous.
- Uterine fibroids are the most common indication for hysterectomy.
- The long-standing debate on total versus subtotal hysterectomy has recently been resolved by a large trial showing no major advantage for one operation over the other. Some differences are that women who have subtotal hysterectomy recover quicker, but a small proportion may experience cyclical vaginal bleeding, and of course will still require smears.
- Although hysterectomy rates appear to be beginning to fall, conservative alternatives to hysterectomy, including endometrial ablative techniques, the Mirena IUS and uterine artery embolization for fibroids have not greatly reduced hysterectomy rates.
- Hysterectomy rates vary widely between regions, and even within the same geographical area. The reasons for this variation are largely unknown.