

# An assessment of present day laparoscopic surgery in Gynaecology

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## ABSTRACT

**Introduction:** *Laparoscopic surgery is today an integral part of modern gynecologic practice. In this review, we will evaluate and examine the efficacy of the various gynaecologic laparoscopic procedures.*

**Methods:** *A literature review based on a Medline search of the various laparoscopic procedures.*

**Results and Conclusions:** *Present day laparoscopic surgery already has established its role in the surgical management of ectopic pregnancy, endometriosis and in adhesiolysis. Although laparoscopic management of benign ovarian cysts is generally accepted, a more cautious approach is still needed in the management of suspicious adnexal masses. The role of operative laparoscopy in gynaecological oncology is still being defined but the initial data seems encouraging. However, laparoscopic myomectomy still seems to be fraught with problems and concern over its long term safety record and will require further investigation. The initial results with laparoscopic colposuspension are encouraging but more long term followup data is needed. Laparoscopic hysterectomy has been shown to be feasible, reproducible and safe. It is a viable alternative to abdominal hysterectomy that can confer all the advantages associated with the laparoscopic approach. Although laparoscopic supracervical hysterectomy may have several theoretical advantages, more data is needed to properly define its role in gynaecology*

**Keywords:** *Operative laparoscopy, gynaecology, review*

## INTRODUCTION

Ever since the early breakthroughs by its pioneers<sup>1-4</sup>, laparoscopic gynaecological surgery has seen both rapid advancement and wide application. However, the challenge today is not whether we can complete a procedure through the laparoscope but whether the laparoscopic approach is both superior and beneficial to the individual patient as well as cost effective for the community at large. In this review, we will evaluate and examine the efficacy of the various gynaecologic procedures including the laparoscopic management of ectopic pregnancy and

endometriosis; laparoscopic tubal surgery and adhesiolysis; laparoscopic Burch colposuspension, laparoscopic management of ovarian cysts as well as its role in gynaecologic oncology; laparoscopic myomectomy and laparoscopic hysterectomy.

## ECTOPIC PREGNANCY

Ectopic pregnancy (EP) is an important cause of maternal death in the first trimester in England and the United States<sup>5,6</sup>. Furthermore, its incidence is apparently rising with reported annual rates of increase of between 4.8 and 8.6 per cent<sup>7,8,9</sup>. The corresponding costs associated with the treatment of this condition is not inconsiderable and has been estimated to exceed US\$ 1 billion in the year 1990 alone in the United States<sup>10</sup>.

The first case report of laparoscopic excision of a tubal ectopic pregnancy was published in 1973<sup>11</sup>.

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Since then, much data has been published concerning the effectiveness of treatment as well as the fertility outcome of EP treated by laparoscopic salpingostomy and salpingectomy.

Laparoscopic salpingostomy in the treatment of EP has been associated with an 85% tubal patency rate; a subsequent intrauterine pregnancy rate of 55–61.2% and a recurrent EP rate of between 14 to 15.5%<sup>12-15</sup>. The rate of persistent EP after laparoscopic salpingostomy has been reported to range from 3.3% to 20% with a mean of 8.3%<sup>15</sup>.

Data on laparoscopic salpingectomy is less extensive but investigators<sup>16,17</sup> have reported subsequent intrauterine pregnancy (IUP) rates of 50–54% and recurrent ectopic pregnancy (REP) rates of 7.7%–15.2%. Dubuisson et al<sup>17</sup> published fertility data on 375 patients who underwent laparoscopic salpingectomy for EP and reported that a past history of tubal surgery and the condition of the contralateral tube were the 2 major determinants of fertility outcome. In those patients with no previous history of tubal surgery or infertility and whose contralateral tube appeared normal, the fertility outcome after laparoscopic salpingectomy appeared comparable to those observed after conservative laparoscopic surgery.

Compared to laparotomy, several authors have shown that for haemodynamically stable patients, the laparoscopic approach had similar operating times, less blood loss and significantly shorter hospital stays<sup>18-22</sup>. Gray et al<sup>22</sup> performed a cost-effective analysis on 109 patients in a previous randomised controlled trial of laparotomy versus laparoscopic treatment of EP and reported that laparoscopic treatment was as effective as laparotomy but at lower costs. Other workers<sup>20,21</sup> have performed similar cost comparisons and have reported similar cost savings of US\$ 1200 to 1500 with laparoscopy. However, these studies included diagnostic laparoscopy as the initial phase of treatment and costs comparisons were made between operative laparoscopy and laparotomy only after diagnostic laparoscopy was completed. Foulk and Steiger<sup>23</sup> performed a cost analysis of laparotomy alone versus laparoscopy and reported that among the stable patients, laparoscopic treatment of EP had savings of 25% per case compared with laparotomy. However, when all the intended laparoscopic excisions (including the 21% of cases which had to be converted to laparotomy) were analysed, the savings were markedly reduced. Furthermore, these cost savings were lost if patients undergoing laparotomy were discharged on or before postoperative day 2.

Persistent ectopic pregnancy (PEP) is a common complication and the major reason for a repeat

intervention after conservative surgical treatment of EP. Seifer et al<sup>24</sup> found a 8.4 times greater risk of PEP with laparoscopic treatment (15.5%) compared with laparotomy (1.8%). Yao and Tulandi<sup>15</sup> reviewed the rate of PEP with laparoscopic treatment after salpingostomy in 11 studies and reported a two-fold increased risk of PEP with laparoscopy (8.3%) compared to laparotomy (3.9%). Various risk factors for the condition have been reported including a short gestation (less than 42 days from the last menstrual period); size (less than 2cm in diameter) and slow postoperative decline of serum human chorionic gonadotrophin levels<sup>24,25</sup>.

In terms of reproductive outcome after salpingostomy, the laparoscopic route appears to be marginally better (with IUP rates of 61% and REP rates of 7%) compared to laparotomy (with IUP rates of 53% and REP rates of 14%)<sup>19,21,26</sup>.

Thus on balance, for haemodynamically stable patients, laparoscopic management of EP is still preferable to laparotomy although the risk of PEP may be higher.

## ENDOMETRIOSIS

Endometriosis has been reported to occur in 30% of patients undergoing laparoscopy<sup>27</sup> and in up to 50% of patients during laparotomy. At present, laparoscopy is fast replacing laparotomy as the surgical treatment of choice for infertile patients with endometriosis.

The incidence of minimal and mild endometriosis is high and has been reported in up to 20% of women of reproductive age<sup>27,29</sup>. However, is laparoscopic treatment of infertile patients with minimal/mild endometriosis more effective than expectant management? Initial data by Nowrsozi et al<sup>30</sup> and Tulandi et al<sup>31</sup> showed that laparoscopic cauterization of minimal/mild endometriosis in infertile patients resulted in significantly higher pregnancy rates compared to expectant management. More data<sup>32</sup> has recently come in to suggest that laparoscopic resection or ablation of minimal and mild endometriosis may indeed enhance fecundity in infertile patients. Marcoux et al<sup>32</sup> reported a randomised, controlled trial involving 341 infertile patients with minimal or mild endometriosis who were randomly assigned to undergo ablation of visible endometriosis or diagnostic laparoscopy only. They reported that laparoscopic surgery could significantly increase the cumulative probability of a pregnancy. (30.7%, as compared with 17.7% for diagnostic laparoscopy alone). Furthermore, the operative laparoscopy could be performed at the same time as the diagnostic laparoscopy with little additional operating time. The authors thus recommend that any minimal/mild endometriosis diagnosed during laparoscopy for infertility should be ablated.

For moderate/severe endometriosis, Gant<sup>33</sup> reported that laparoscopic surgery was as effective as laparotomy in correcting infertility with similar complication rates. Hughes et al<sup>34</sup> reviewed 11 papers on laparotomy and 9 studies describing laparoscopic treatment of severe endometriosis. They found that the mean pregnancy rate for patients treated laparoscopically (56%) was higher than for patients who had conservative surgery by open laparotomy (38.5%). Adamson and Pasta<sup>35</sup> in a large meta-analysis, found that for patients with moderate/severe endometriosis, laparoscopic surgery was just as effective as open laparotomy in improving pregnancy rates. As for the treatment of endometriomas, Bateman et al<sup>36</sup> in a retrospective case control study comparing laparoscopic treatment of endometriomas with laparotomy, found no significant differences between the two approaches in terms of operating time, recurrence of the endometriomas and pregnancy rates. However, the group treated laparoscopically had less estimated blood loss and shorter postoperative recovery times. Adamson et al<sup>37</sup> also compared the use of CO<sub>2</sub> laser laparoscopy with laparotomy for the treatment of endometriomas and found both to be equally effective in terms of pregnancy rates.

The current data also suggests that both laparoscopic electrocautery and laparoscopic laser treatment of endometriosis are equally effective in terms of subsequent pregnancy rates<sup>38,39</sup>.

Thus laparoscopic surgery at present still has an effective role in the treatment of all stages of endometriosis, producing pregnancy rates comparable with treatment by open laparotomy, with the added advantage of shorter hospitalisation and faster postoperative recovery.

#### LAPAROSCOPIC TUBAL SURGERY

Although laparoscopic surgery is generally not efficacious for proximal tubal disease, it has a place in the treatment of distal tubal occlusion (salpingo-ovariolysis, salpingostomy, fimbrioplasty) and possibly also for the reversal of previous sterilization.

The first series of laparoscopic salpingo-ovariolysis was published by Gomel<sup>40</sup>. Since then, the literature has generally reported intrauterine pregnancy (IUP) rates of 20–62% and tubal pregnancy rates of 4.0 – 7.5% after this procedure<sup>41–44</sup>.

Ever since the first laparoscopic salpingostomy reported by Gomel<sup>45</sup> in 1977, several series and case-controlled studies have reported pregnancy rates of 20 to 67%<sup>46–49</sup> and EP rates of 3 to 11%<sup>44,48,50,51</sup>. These results achieved by laparoscopic salpingostomy are similar to those obtained after open

surgery and rival even those of microsurgery<sup>52</sup>. Furthermore, the laparoscopic procedure, which can be effected at the time of diagnostic laparoscopy, has the added advantages of reduced postoperative pain, prompt recovery and the avoidance of a second procedure.

The reported IUP rates for laparoscopic fimbrioplasty range from 25–50% with EP rates of 5–13%<sup>41,42,44,48,51</sup>. These results are encouraging and are similar to those obtained after microsurgery<sup>53</sup>.

Previously, tubal re-anastomotic procedures for reversal of sterilization have always required the use of open microsurgical techniques. More recently, several workers have demonstrated that laparoscopic tubal re-anastomoses are not only possible but also associated with encouraging pregnancy rates<sup>54,55</sup>. Using new innovative laparoscopic micro-instruments (Koh Ultramicro Series), Koh and Janik<sup>54</sup> were able to successfully treat 40 cases with a subsequent pregnancy rate of 71% at 12 months follow up. Their reported ectopic pregnancy rate was 5%. Yoon et al<sup>55</sup>, using a similar technique in 186 patients, also reported cumulative pregnancy rates of 60.3%, 79.4%, and 83.3% at 6, 12, and 18 months after operation, respectively. Only five of their patients (3.2%) had subsequent ectopic pregnancies.

#### ADHESIOLYSIS

Although there are no randomised controlled trials comparing laparoscopic adhesiolysis to open laparotomy in the treatment of infertility; an analysis of published studies by Hershlag et al<sup>56</sup> did suggest that pregnancy rates with laparoscopic adhesiolysis (43%) were comparable with microsurgical adhesiolysis via laparotomy (47%) but were better than open macrosurgical adhesiolysis (33%). Other workers<sup>57,58</sup> have also reported that compared to laparotomy, laparoscopic adhesiolysis is associated with less severe recurrent as well as fewer de novo adhesions. However, other workers have found no difference in postoperative adhesions after open surgery or laparoscopic adhesiolysis<sup>59,60</sup>.

Thus based on postoperative adhesions as well as pregnancy rates, the results of laparoscopic adhesiolysis are at least comparable to, if not better than those of open surgery. Furthermore, the laparoscopic procedure is associated with shorter hospital stay, faster recovery and can be performed at the time of diagnostic laparoscopy.

#### LAPAROSCOPIC BURCH COLPOSUSPENSION

Burch first reported his procedure of retropublic

colposuspension for urinary stress incontinence in 1961<sup>61</sup>. Since then, the procedure has gained wide acceptance as a treatment of genuine urinary stress incontinence with success rates of 57–100%<sup>62–64</sup>.

The first laparoscopic colposuspension was reported by Vancaillie and Schuessler<sup>65</sup> in 1991. Although the laparoscopic approach is now possible, the procedure still basically aims to elevate the urethrovesical junction by suspending the anterior vaginal wall onto the Cooper's ligament. Both the transperitoneal<sup>66</sup> and retroperitoneal<sup>67</sup> approaches have been described as well as different techniques used to secure the vaginal wall to the Cooper's ligament<sup>66,68,69</sup>.

Liu<sup>66</sup> in a large series of 132 cases of laparoscopic Burch colposuspension, reported a success rate of 96%. However, only half of the patients had up to one year of follow up. In another series by Yang et al<sup>70</sup>, 79 patients with urinary stress incontinence were treated by laparoscopic bladder neck suspension. They reported a success rate of 90% but follow up was only for six months. Other smaller series<sup>71–73</sup> with longer follow up periods (17 to 24 months) have reported success rates of 85–100%.

Polascik et al<sup>74</sup> compared the results of laparoscopic colposuspension with the traditional open Burch urethropexy in 22 women with urinary stress incontinence. Of the 12 patients who had the laparoscopic procedure, 83% were still continent (mean follow up 20.8 months) as compared to 70% of the women after open Burch colposuspension (mean follow up 35.6 months). Although the laparoscopic procedure had longer operating times, it was associated with less need for postoperative analgesia, shorter periods of hospitalisation and a more rapid return to normal activity when compared to the open technique.

Burton<sup>75</sup> published a 3 year prospective randomized urodynamics study that compared both the open and laparoscopic colposuspension procedures. During the 3 year follow-up of 60 patients, he reported that the laparoscopic group had significantly higher rates of stress incontinence when compared to the open surgery group (40% vs 6.7%,  $P < 0.05$ ). However, this particular study was later criticized because of the relative inexperience of the surgeon involved (had only performed 10 procedures at start of trial).

Lavin et al<sup>76</sup>, in a retrospective study, generally reported less voiding difficulties in the laparoscopic group (16%) compared to those treated using the open approach (52%). Concerning de novo detrusor instability, several authors<sup>76,77</sup> have also shown that the incidence of detrusor instability following a laparoscopic Burch (6%)

is comparable to that following an open procedure (7.6%).

Thus on balance, the limited data may seem to suggest a trend towards lower success rates for the laparoscopic procedure compared to the conventional open technique. However, in terms of perioperative morbidity, analgesia and hospital stay, the laparoscopic approach appears to be superior. In addition, tentative data may also suggest a lower incidence of voiding dysfunction associated with the laparoscopic Burch procedure. Rates of detrusor instability after both procedures also appear comparable. There is thus still a need for additional long term data as well as for more randomised prospective trials comparing the laparoscopic procedure with the traditional open method.

## OVARIAN CYSTS

Ovarian cysts are one of the most common indications for laparoscopic intervention<sup>78</sup>. Although there are no randomised controlled trials comparing open surgery and laparoscopic management of benign ovarian cysts, several observational series have suggested that operative time, recovery period and cost of treatment would be less with laparoscopy<sup>79,80,81</sup>. Yuen et al<sup>82</sup> published a comparative study of laparoscopy versus laparotomy and found that the laparoscopic group had less blood loss, postoperative analgesic requirements, morbidity; shorter hospitalisation and recovery time. There was also no increased incidence of cyst rupture but laparoscopic operating times were longer. Gal et al<sup>83</sup> also found that the patients treated by the laparoscopic route had less postoperative morbidity and faster recovery but the incidence of intraoperative cyst rupture was higher (33%) compared to the group treated by open surgery (12%).

However, laparoscopic management of ovarian cysts is not without its problems because of the fear of inappropriate treatment of patients with ovarian cancer<sup>84</sup>. However, the majority of adnexal masses in pre- and postmenopausal patients are benign<sup>85</sup> and with careful pre- and intraoperative assessment, safe laparoscopic management of ovarian masses is possible<sup>86–88</sup>. Nezhat et al<sup>86</sup> reported a series of 1011 patients with ovarian masses who were successfully managed laparoscopically with a laparotomy rate of less than 5%. More importantly, there were no cases of ovarian cancer missed at the time of surgery. Canis et al<sup>87</sup> in a series of 757 cases with ovarian masses, reported that all malignant tumours were diagnosed at the time of laparoscopy after following strict pre- and intraoperative guidelines. The laparotomy rate reported in that study was 11.7% but would have been higher than 50% if all the suspicious ovarian masses had been managed by

laparotomy. Canis et al<sup>88</sup> also analysed data collected over a 14 year period and concluded that by performing diagnostic laparoscopy for ovarian masses suspicious at ultrasound and laparotomy for masses suspicious at laparoscopy, 80% of the cases could be safely treated by the laparoscopic approach.

However, use of the laparoscopic approach in the treatment of possibly malignant ovarian cysts is still not without its own concerns. Cases of tumour dissemination following inadvertent laparoscopic puncture/excision of malignant ovarian tumours have been reported, especially if definitive surgery was delayed for weeks or even months<sup>84,89</sup>. Furthermore, the prognosis after laparoscopic rupture or puncture of a stage 1 epithelial ovarian cancer is largely unknown, even if laparotomy was performed immediately. Although several publications<sup>90-92</sup> using multivariate analysis have reported that surgical rupture of the early stage tumour did not ultimately affect prognosis, the literature is still far from clear<sup>93</sup>. More recently, the problem of port site metastases after laparoscopic intervention has also been recognised and will be discussed later. Thus, although laparoscopic surgery is beneficial in the treatment of benign ovarian cysts, laparoscopic management of suspicious masses should be approached cautiously with strict pre- and intraoperative guidelines. Also pertinent too, is the need for more long term data to confirm that the prognosis of early ovarian cancer is not adversely affected by laparoscopic puncture/excision followed by immediate laparotomy.

#### ROLE OF LAPAROSCOPY IN GYNAECOLOGIC ONCOLOGY

Early publications on the role of laparoscopy in gynaecologic oncology was centred on its use as a second-look procedure in ovarian cancer<sup>94,95</sup>. However, several authors have reported a high rate of false negative second-look laparoscopies ranging from 18–55%<sup>96-98</sup>. The problem of anterior abdominal wall adhesions and the risk of bowel injury has also been highlighted<sup>99</sup>. Thus at present, second-look laparoscopy for ovarian cancer is probably only useful in the context of clinical trials.

However, modern operative laparoscopy's first role in gynaecologic oncology was in the sampling of pelvic lymph nodes in patients with early cervical cancer prior to radical hysterectomy. Dargent<sup>100</sup> was the first to describe his technique of retroperitoneal laparoscopic pelvic lymphadenectomy and concluded that the procedure was both safe and reliable. Querleu et al<sup>101</sup> were the first to report transperitoneal laparoscopic pelvic lymphadenectomy which is more commonly used today<sup>102,103</sup>. Several authors<sup>104-106</sup> have also published their experience with laparoscopic pelvic

lymphadenectomy as well as para-aortic lymph node sampling in the management of patients with cervical carcinoma. Their early data<sup>105-106</sup> seems to suggest that laparoscopic lymphadenectomy can be accomplished with few complications, acceptable operating times, short postoperative stays and achieving node counts comparable to those obtained at laparotomy. Although these initial reports do indicate that laparoscopic pelvic and para-aortic lymphadenectomy are feasible, more data is required before the role of these laparoscopic procedures can be properly defined.

The laparoscopic approach has also been adapted to perform radical hysterectomies in the treatment of cervical carcinoma. Radical hysterectomy performed entirely through the laparoscope has been described by several authors<sup>105,107</sup>, with reported mean operating times of 270–315 mins. Pomel et al<sup>108</sup> published a series of 41 cases of laparoscopic radical hysterectomy performed for carcinoma of the cervix. The authors reported no major operative and postoperative complications. The series had a follow up period of 4–76 months with no reported tumour recurrence. An alternative to the above mentioned complete laparoscopic approach, is the laparoscopically assisted radical vaginal hysterectomy described by Querleu<sup>109</sup>. Several authors<sup>105,109</sup> performing this procedure have reported mean operating times of 163 to 281 minutes. Querleu<sup>109</sup> in a series with up to 4 years of follow up, reported a pelvic wall recurrence rate of 4 % which is comparable to that seen after open radical hysterectomy. However, more long term survival data is still required to properly assess these radical laparoscopic procedures.

Several authors<sup>110-112</sup> have published their experience with laparoscopic staging and treatment of endometrial cancer. In a large series reported by Childer<sup>112</sup>, 65 patients with endometrial cancer were evaluated laparoscopically, including 33 patients who had laparoscopic lymphadenectomy. All but 2 patients had laparoscopically assisted vaginal hysterectomy with only 2 major procedure-related complications (1 ureteric and 1 bladder injury). Estimated blood loss was less than 200 mls and the average hospital stay was 2.9 days. They concluded that laparoscopic management of early endometrial cancer was feasible and attractive but long term survival data will be needed to confirm their beliefs.

Another recognised problem is that of port-site metastases in patients who have undergone laparoscopy or laparoscopic assisted procedures. To date, there have been 19 cases of port-site metastases after laparoscopic surgery for gynaecological malignancy reported in the literature<sup>113</sup>. These have involved patients with ovarian carcinoma, borderline

ovarian tumours, cervical squamous cell carcinoma and endometrial carcinoma<sup>113-118</sup>. There is some data<sup>119</sup> to suggest that surgical trauma may promote tumour metastasis but direct implantation is believed to be the main mechanism involved in the pathogenesis of port-site recurrence<sup>119,120</sup>. Various preventive measures have been suggested including the use of protective laparoscopic bags to prevent wound contamination<sup>113</sup> as well as providing sufficiently large abdominal wall or posterior cul-de-sac incisions for specimen removal<sup>114</sup>. Some authors have also highlighted the fact that the carbon dioxide pneumoperitoneum may also increase tumour dissemination and that gasless laparoscopy may be useful in decreasing the incidence of this complication<sup>113,121</sup>.

Thus although laparoscopic treatment of gynaecologic malignancy is now possible, more long term survival data for patients treated with these procedures are needed. Furthermore, cost data comparing laparoscopic surgery to traditional open surgery in the management of patients with gynaecologic cancer is also unavailable. These and other issues must be addressed before the role of laparoscopy in gynaecologic oncology can be properly determined.

#### LAPAROSCOPIC MYOMECTOMY

The first laparoscopic myomectomy (LM) was performed by Semm and Mettler<sup>122</sup> in 1980 when they removed several pedunculated subserous fibroids. Since then, several descriptive series<sup>123-126</sup> on laparoscopic myomectomy have been published and these have highlighted several problems associated with the procedure. Long operating times have been reported with some exceeding seven hours<sup>125</sup>. This may be related to the need to morcellate the fibroids to facilitate their removal as well as the need for laparoscopic suturing which can be tedious<sup>126</sup>. Increased adhesion formation has also been described following this procedure<sup>126</sup>. Furthermore, several authors<sup>127,128,129,130</sup> have also reported cases of uterine rupture/dehiscence following LM. This thus demonstrates the need for careful uterine repair following this laparoscopic procedure.

The largest series of pregnancies after a LM was recently published by Dubuisson et al<sup>131</sup>. Among the 100 patients who eventually had deliveries, only one uterine rupture occurred at the site of the old LM scar (1%; 95% CI, 0.0-5.5%). Although the authors concluded that spontaneous uterine rupture seems to be rare after LM, they caution and re-iterate that particular care must still be given to uterine closure.

Data on the risk of recurrence after LM has been published by Candiani et al<sup>132</sup> who in a series of 622

patients monitored with ultrasonography, reported a cumulative 10 year recurrence rate of 27%. Although several authors<sup>125,133</sup> have reported pregnancies after LM, there is still no long term data on subsequent fertility following the procedure. Goldfarb<sup>134</sup> also described laparoscopic myolysis using the neodymium-yttrium-aluminium-garnet (Nd-YAG) laser to drill holes in myomas and reported significant reduction in fibroid size with no recurrence after 6 to 14 months. However dense adhesions have been reported to occur following this procedure<sup>135</sup>.

Mais et al<sup>136</sup> conducted a prospective randomized trial comparing early postoperative outcome between laparoscopic myomectomy and laparotomy in 40 patients. They reported less postoperative pain, a shorter hospital stay and a faster rate of recovery after laparoscopy as compared to open surgery. Several authors<sup>123-126,136</sup> have also suggested that laparotomy may be preferable to the laparoscopic approach in patients with large multiple myomas, especially in the presence of severe endometriosis.

Thus although laparoscopic myomectomy has been shown to be feasible, the technique is fraught with problems. Furthermore, its place in the treatment of infertile patients still needs to be defined.

#### LAPAROSCOPIC HYSTERECTOMY

Ever since the first hysterectomy by Charles Clay in 1844, the procedure is presently one of the commonest operations performed on women of the reproductive age group. It has been reported that approximately 1 in 5 women in the United Kingdom<sup>137</sup> would have had a hysterectomy by age 55; whilst in the United States, some 37% of women would have had the same procedure by age 60<sup>138</sup>. Furthermore, the literature<sup>137,138</sup> also indicates that most hysterectomies (75-88%) are performed using the abdominal approach. The first laparoscopic hysterectomy was performed by Reich in 1988<sup>139</sup> and since then, data has been published comparing laparoscopic hysterectomy (LH) with abdominal hysterectomy (AH) and vaginal hysterectomy (VH).

#### LAPAROSCOPIC VERSUS ABDOMINAL HYSTERECTOMY

The first randomised trial comparing laparoscopic and abdominal hysterectomy was published by Nezhat et al<sup>140</sup> in 1992. The authors reported that although the laparoscopic procedure took longer (160 versus 102 minutes), the patients had a shorter period of hospitalisation, a more rapid recovery and fewer complications. Other workers<sup>141-143</sup> comparing the 2 procedures also reported similar findings. Meikle et al<sup>144</sup> published a summary of aggregated data

published between 1989 and 1995 comparing the various outcomes of laparoscopic hysterectomy (LH), total abdominal hysterectomy (TAH) and vaginal hysterectomy (VH). The authors reported an average operative time of 115 minutes for the laparoscopic procedure compared to 87 minutes for TAH ( $p < 0.001$ ). However, the patients in the LH group had shorter hospital stays (average of 49 hours) compared to 79 hours for the TAH group ( $p < 0.001$ ). Railton et al<sup>145</sup> also reported an earlier resumption of sexual activity after LH (4 weeks) compared to TAH (8 weeks). Furthermore, patients undergoing LH also resumed work earlier (after 2–6 weeks) compared to TAH (after 5–9 weeks)<sup>142,145,146,147</sup>.

Earlier studies<sup>148,149</sup> comparing costs for LH and TAH showed that the laparoscopic procedure was cheaper (US\$500–1500) than open surgery because of the shorter hospital stay associated with the laparoscopic approach. Mehra et al<sup>150</sup> in an analysis of 300 cases of LH, reported similar cost between LH and TAH. Tsaltas et al<sup>151</sup> in a 1997 publication comparing the cost of LH and TAH, reported that the 2 procedures were not significantly different, despite the use of disposable instruments in the laparoscopic procedure. Meikle et al<sup>144</sup> reported that when LH and TAH were compared, the cost of the laparoscopic procedure was higher in seven out of eleven studies. However, when the use of disposable instruments and length of hospital stay were considered, the remaining 4 studies reported a lower cost for the laparoscopic procedure. Boike et al<sup>152</sup> also found significantly higher costs associated with LH compared to TAH and attributed this to the longer operating time and the use of disposable equipment. East<sup>153</sup> also published data showing that more than 50% of the cost of LH was due to the use of disposable trocars and stapling devices. Thus with increasing operator experience and a reduced reliance on disposable laparoscopic equipment, the present day cost of the procedure might be reduced.

Johns et al<sup>154</sup> published summary rates of bowel, bladder and ureteral injury of 1% for both LH and TAH. Meikle et al<sup>144</sup> reported a total major complication (pulmonary embolus, transfusion, sepsis, fistula, bladder, bowel and ureteric injury) rate of 4% for LH. They also found significantly higher rates of bladder injury associated with LH than with TAH. Harris and Daniell<sup>155</sup> reviewed data on the complication rates of LH and compared these to existing rates for TAH and VH. Although they reported that the risks of haemorrhage, vesicovaginal fistula, ureteric and bowel injury were similar between TAH and LH, they found a higher bladder injury rate compared to TAH. Infectious morbidity was however, decreased in LH compared to TAH.

Thus LH is a viable alternative to AH, enabling the conversion of an abdominal operation into a laparoscopic/vaginal procedure with all the advantages associated with the laparoscopic approach. Furthermore, the cost of laparoscopic hysterectomy may be further reduced with less use of expensive disposable laparoscopic equipment.

#### LAPAROSCOPIC HYSTERECTOMY VERSUS VAGINAL HYSTERECTOMY

Several authors<sup>156,157</sup> have published data comparing the efficacy of LH and VH and reported that although the postoperative outcomes were similar for both procedures; the mean operating times for LH was significantly longer (120.1 minutes versus 64.7 minutes). Richardson et al<sup>157</sup>, in a prospective randomised trial comparing LH and VH, also found that LH took longer (mean duration 131 versus 77 minutes). Complication rates, blood loss, analgesia and postoperative recovery were similar for both procedures. Meikle et al<sup>144</sup> in a review of literature published between 1989 and September 1995, also concluded that there were no significant differences between the rates of bowel, bladder and ureteral injuries after LH and VH.

Several investigators<sup>152,156,158</sup> have also made cost comparisons between LH and VH. Summitt et al<sup>156</sup> reported a mean hospital charge of US\$7905 for LH compared to US\$4891 for VH. They found that the major factors contributing to higher costs for LH were the use of disposable staples and instruments as well as the longer operating/ anaesthesia times associated with the laparoscopic technique. Boike et al<sup>152</sup> compared 82 cases of LH with 73 cases of VH and reported that the cost for LH was significantly greater. The authors also attributed the higher cost of the laparoscopic procedure to the increased operating time and use of disposable equipment. Ransom et al<sup>158</sup> published a cost analysis of endometrial ablation, AH, VH and LH in the treatment of primary menorrhagia. They also concluded that patients treated with VH had a mean hospital cost (US\$7413) that was significantly lower than that of LH (US\$11,534).

Thus, although LH is as affective as VH, it is still the more costly option. Therefore, there is little advantage in choosing the laparoscopic approach when a vaginal hysterectomy can easily be performed. However, LH may still be the preferable option in cases where a VH is either difficult or even contraindicated. Several authors<sup>152,159</sup> have also stressed that the laparoscopic approach is especially useful in patients with associated adhesions, endometriosis or adnexal pathology.

### LAPAROSCOPIC SUPRACERVICAL VERSUS LAPAROSCOPIC HYSTERECTOMY

The first laparoscopic supracervical hysterectomy (LSH) was performed by Semm<sup>160</sup> in 1991. However, the concept of the supracervical or subtotal hysterectomy (STH) is not a new one and in fact, the subtotal procedure was the uterine extirpative operation of choice until the 1940's<sup>161</sup>. More recently, there has been a renewed interest in the subtotal procedure with its proponents citing its various advantages including less pelvic abscess formation<sup>162</sup>, a lower incidence of bladder and sexual dysfunction<sup>163,164</sup>; a lower risk of urinary tract injuries<sup>162</sup> and a possibly lower risk of prolapse when compared to total hysterectomy. Several investigators<sup>165-167</sup> have recently published data comparing LH and LSH. Compared to LH, the laparoscopic subtotal procedure was reported to be associated with less blood loss<sup>165</sup>, shorter operating times<sup>165</sup>, shorter hospital stays<sup>165,167</sup>, faster return to normal activity<sup>165</sup> and earlier resumption of sexual intercourse<sup>167</sup>. There were no significant differences in the incidence of intraoperative and postoperative morbidity between the 2 laparoscopic techniques except for a higher incidence (10%) of postoperative cyclical bleeding after the subtotal procedure<sup>167</sup>. The subtotal procedure also requires the morcellation and removal of the corpus from the peritoneal cavity. Thus, although LSH is feasible

and the results are encouraging, more prospective data is still required to assess this technique.

### CONCLUSION

Thus present day laparoscopic surgery already has established roles in the surgical management of ectopic pregnancy, endometriosis and in adhesiolysis. Although laparoscopic management of benign ovarian cysts is generally accepted, a more cautious approach is still needed in the management of suspicious adnexal masses. The role of operative laparoscopy in gynaecological oncology is still being defined but the initial data seems encouraging. However, laparoscopic myomectomy still seems to be fraught with problems and concern over its long term safety record will yet require more thorough investigation. The initial results with laparoscopic colposuspension are encouraging but more long term followup data is needed. Laparoscopic hysterectomy has been shown to be feasible, reproducible and safe. It is a viable alternative to abdominal hysterectomy, that confers all the advantages associated with the laparoscopic approach. Although laparoscopic hysterectomy is probably not superior to vaginal hysterectomy, it still has a role in selected cases where the latter may be difficult or dangerous to perform. Although laparoscopic supracervical hysterectomy may have several theoretical advantages, more data is needed to properly define its role in gynaecology.

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