

The Impact of Minimal Access Surgery on Gynaecological Surgery in a University Gynaecological Unit Over a 10-Year Period from 1991 to 2000

F H Loh, N Hameed, S C Ng

ABSTRACT

Objective: To assess the impact of minimal access surgery in replacing traditional open approach of surgery for benign gynaecological pathology.

Setting: Gynaecological unit in a university hospital

Methodology: All surgical procedures for the treatment of ectopic pregnancy, benign ovarian cyst, myomectomy, and hysterectomy for benign gynaecological pathology over a 10-year period (1991 to 2000) were studied. The percentages of procedures performed with the minimal access approach were compared with the traditional open approach over the study period.

Findings: The percentage of ectopic pregnancies treated laparoscopically has increased from a low of 27% in the initial two-year period of 1991-92 to stabilise at approximately 70% at the end of the decade. Laparoscopic approach for the treatment of benign ovarian cysts constituted just 31% of cases in the initial period (1991-92) and rose steadily to stabilise at approximately 50% of cases during the last four years of the decade. The proportion of advanced minimal access procedures such as myomectomy and hysterectomy increased at a more gradual pace during the decade. By 1999-2000, laparoscopic and hysteroscopic myomectomy constituted about 30% of all myomectomies but laparoscopic hysterectomy accounted for just about 5% of all hysterectomies performed.

Conclusions: Minimal access surgery has largely replaced the open approach for the treatment of ectopic pregnancy and benign ovarian cysts. Advanced minimal access procedures such as myomectomy and hysterectomy showed a rising trend through the decade, but still accounted for a minority of procedures at the end of the decade.

Keywords: Gynaecological Surgery, Laparoscopy, Hysteroscopy

Singapore Med J 2002 Vol 43(4):177-181

INTRODUCTION

Minimal access surgery has revolutionised the field of gynaecological surgery and changed the way pelvic surgery was practised over the past decade. This came about with the realisation that the minimal access approach, in trained hands, allowed for a much more elegant form of surgery with reduced trauma to the abdominal wall and pelvic tissue. The result was improved patient recovery with reduced post-operative pain, shorter hospitalisation, and earlier return to normal function⁽¹⁻⁷⁾. Presently, almost all gynaecological procedures can find an alternative laparoscopic or hysteroscopic approach.

The laparoscopic approach had its infancy in gynaecology in the middle of the twentieth century, firstly with diagnostic laparoscopy and later with simple tubal sterilisation procedures. However, serious laparoscopic surgery only began in the 1970s with reports of laparoscopic treatment of ectopic pregnancy^(8,9). From the mid-1980s to the early 1990s, its application has exploded to include almost any and every gynaecological procedure: including ovarian cystectomy⁽¹⁰⁾, myomectomy⁽¹¹⁾, hysterectomy⁽¹²⁾, radical procedures for advanced endometriosis^(13,14), and various procedures for repair of pelvic floor relaxation including Burch colposuspension⁽¹⁵⁾. In addition, enthusiasts were also advocating the laparoscopic approach for early stage cervical and endometrial cancer such as laparoscopic lymphadenectomy and radical hysterectomy^(16,17). However, the area of laparoscopy in the management of cancer remained very controversial, and more information is needed before it can be advocated as an alternative in standard clinical practice.

The ability to translate the potential benefits of minimal access surgery into actual results in patients depends, in part, on how widely the technique has been adopted. An assessment of the impact of gynaecological laparoscopic and hysteroscopic surgery on the gynaecological surgery is important in evaluating how successful we have been in achieving this goal. It is also an indicator of the maturity of our development in this area.

Department of
Obstetrics &
Gynaecology
National University
Hospital
5 Lower Kent
Ridge Road
Singapore 119074

F H Loh,
MBBS (S pore),
MRCOG (London),
FAMS
Associate Professor/
Consultant

N Hameed,
MBBS (Pakistan),
MRCOG (London)
Fellow

S C Ng,
MBBS (S pore),
FRCOG (London),
PhD
Professor/Senior
Consultant

Correspondence to:
Dr F H Loh
Tel: (65) 6772 4261
Fax: (65) 6779 4753
Email: fh_loh@
pacific.net.sg

Table I. Number of gynaecological procedures performed for benign pathology, 1991 to 2000.

| Surgical Procedures (n) | 1991-92 | 1993-94 | 1995-96 | 1997-98 | 1999-2000 |
|------------------------------------|---------|---------|---------|---------|-----------|
| Treatment of Ectopic Pregnancy | 104 | 120 | 134 | 81 | 116 |
| Treatment of Benign Ovarian cyst | 139 | 197 | 214 | 184 | 118 |
| Myomectomy | 73 | 65 | 91 | 78 | 68 |
| Hysterectomy for benign conditions | 346 | 425 | 454 | 378 | 444 |

METHODS

The department of Obstetrics and Gynaecology at the National University Hospital in Singapore has a staff strength varying between 16 to 22 consultants, six to 10 senior registrars/registrar and six to nine residents during the study period of 1991-2000. Of these, six consultants have additional training in minimal access surgery and provide supervision of cases by registrars/senior registrars as well as fellow consultants for cases which were performed with the minimal access approach. The coverage included providing a special roster of consultants trained in minimal access surgery for emergency procedures such as for ectopic pregnancies, as well as a roster to provide assistance for elective gynaecological procedures.

All gynaecological procedures were recorded in the departmental gynaecological surgery statistics. From these records, four groups of procedures performed over a 10-year period (1991 to 2000) were studied. The four groups of procedures were: surgical treatment of ectopic pregnancy (open or laparoscopic salpingostomy/salpingectomy), surgical treatment of benign ovarian cysts (open or laparoscopic ovarian cystectomy/oophorectomy), myomectomy (open, hysteroscopic or laparoscopic), and hysterectomy for benign gynaecological pathology (open, vaginal or laparoscopic).

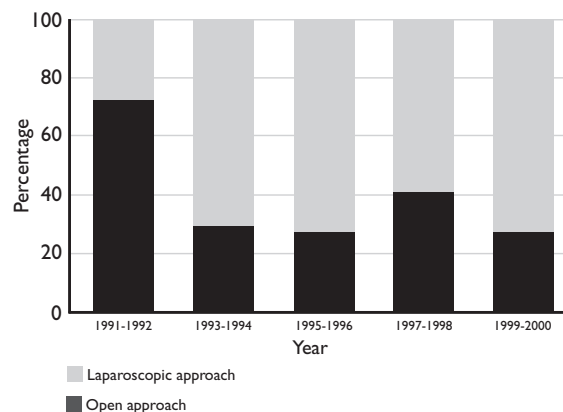
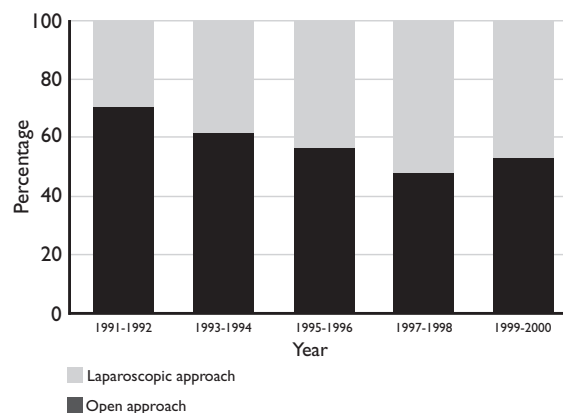
The 10-year time frame was divided into five two-year periods for comparison. For each group of procedures, the percentages of the open approach were compared with the laparoscopic/hysteroscopic approach for each two-year period. The time trend over the 10-year period was thus compiled for each of the four major groups of procedures. The Epistat statistical software programme using χ^2 test for trends was employed to test for statistical significance.

RESULTS

Ectopic pregnancy

The number of surgical procedures for ectopic pregnancy in each two-year period between 1991 and 2000 is as shown in Table I.

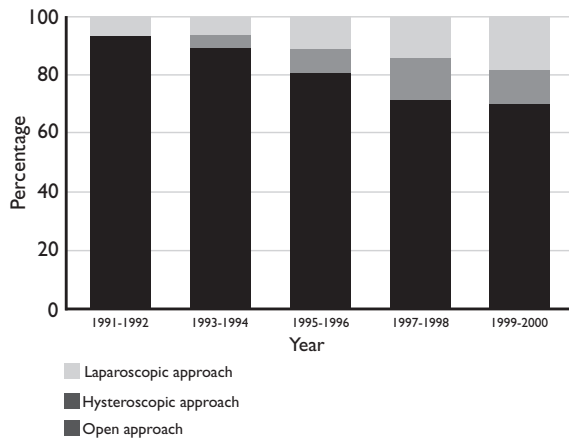
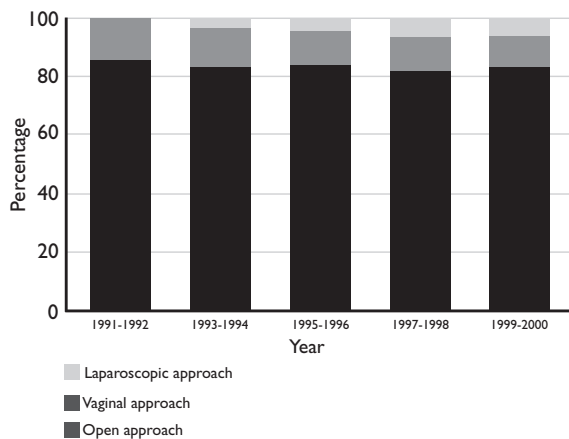
Laparoscopic treatment of ectopic pregnancy at the beginning of the decade in the period 1991-1992 accounted for just 29% of all surgery performed for

Fig. 1 Surgical treatment of ectopic pregnancy.**Fig. 2** Surgical treatment of benign ovarian cysts (Cystectomy/Oophorectomy).

ectopic pregnancy. It rapidly increased to 70% by the second two-year period of 1992-1993. This level was generally sustained throughout the remainder of the decade, with the last two-year period (1999-2000) recording a 72% laparoscopic approach for ectopic pregnancies (Fig. 1). This trend towards increasing laparoscopic application was statistically significant ($p < 0.0001$).

Benign ovarian cysts

The number of surgical procedures for benign ovarian cysts (ovarian cystectomy/oophorectomy) varied greatly over the 10-year period, from a low of just 139 procedures over the two-year period of 1991-1992 to a high of 214 procedures in the two-year period of 1995-96 (Table I).

Fig.3 Myomectomy.**Fig.4** Hysterectomy for benign gynaecological conditions.

The laparoscopic approach in the first two years of 1991-92 constituted just 31% of procedures for benign ovarian cysts. There was a slower take-up rate of the laparoscopic approach for ovarian cysts when compared with that for ectopic pregnancies. The gradual increase stabilised at a level of 50% during the last four years of the decade: 52% during 1997-1998, and 48% during 1999-2000 (Fig. 2). This trend towards increasing laparoscopic application was statistically significant ($p=0.00015$).

Myomectomy

Each of the two-year periods between 1991 and 2000 saw a steady number of myomectomies performed, ranging over a narrow band of 65 to 91 procedures (Table I).

Laparoscopic myomectomy did not have as great an impact as laparoscopic treatment of ectopic pregnancies and benign ovarian cysts over the entire decade studied. However, there was a steady increase in the percentage of laparoscopic myomectomies performed from 7% in the first two-year period in

1991-1992 to 18% in the most recent two-year period of 1999-2000. (Fig. 3)

Hysteroscopic resection of myomas was applicable only to a select subset of patients with submucous fibroids. Hysteroscopic resection of submucous myomas saw a slow but increasing application from none performed in the first two-year period of 1990-1991, to reach 12-14% of all myomectomies performed in the last two-year periods of 1997-98, and 1999-2000 (Fig. 3). This trend towards increasing laparoscopic and hysteroscopic application was statistically significant ($p<0.001$).

Hysterectomy

The total number of hysterectomies performed during two-year period over the decade varied greatly between a low of 346 procedures during 1991-1992 to a high of 454 procedures during 1995-1996 (Table I).

Laparoscopic hysterectomy did not feature at all in the first two-year period (1991-1992) except for one case performed by an invited foreign faculty. Subsequently, 13 laparoscopic hysterectomies were performed in the next two-year period of 1993-1994, accounting for just 3% of all hysterectomies for benign gynaecological conditions. Although there was a further rise in the number of procedures, the percentage laparoscopic hysterectomies remained at about 5 to 6% of all hysterectomies in the last two-year periods of 1997-1998 and 1999-2000 (Fig. 4). Test for statistical significance of trend towards increasing application of laparoscopic hysterectomy for benign gynaecological conditions showed a p value of 0.012.

Other procedures

Other procedures performed within the department by our team of gynaecologists trained in minimal access surgery included laparoscopic resection of advanced (recto-vaginal) endometriosis, laparoscopic Burch colposuspension, and laparoscopic tubal reanastomosis. However, as the number of these procedures were limited and were only performed in the last few years of the study period, they were not included in this particular analysis.

DISCUSSION

The benefits of minimal access surgery are evident provided the practitioners are trained in the technique. Some applications, particularly those which can be easily performed by a generalist have found immediate impact, whilst others, such as the more advanced procedures which require additional training and special skills, have had a much lower short-term impact.

The treatment of ectopic pregnancy was one of the earliest applications of the laparoscopic surgery. It was first described in the 1970s^(8,9) but the technique really matured in the 1980s⁽¹⁸⁾. It is a relatively simple procedure and is generally one of the first conditions that a gynaecologist beginning his or her experience in laparoscopic surgery will deal with.

The applicability of the laparoscopic approach was facilitated by the early diagnosis of most patients with ectopic pregnancies in recent years. Increasing awareness of this condition by our population and the availability of sensitive β -hCG assays have allowed the condition to be diagnosed early while the patients are relatively stable and symptomatic. This is in distinct contrast to the situation several decades ago when most patients with ectopic pregnancies presented late, with severe abdominal pain and often in a state of shock. The 30% of patients treated by the open approach in the latter half of the decade were largely for patients who have some degree of haemodynamic instability. The ability to decrease the laparotomy rate for ectopic pregnancies further depends to a large extent on our ability to achieve early diagnosis of ectopic pregnancy for an even greater proportion of our patients.

There are few published studies in the literature that reported the overall applicability of the laparoscopic approach. One paper, a prospective multi-centre study⁽¹⁹⁾ involving nine teaching hospitals in Hong Kong looked at 614 ectopic pregnancies treated over a one-year period between mid-1996 to mid-1997. The authors reported that the laparoscopic approach was applicable in 62.2% of their cases. This compared well with our figure of 72% over the same period. However, it is known that in specialised centres, over 90% of ectopic pregnancies can be treated laparoscopically (personal communication).

The laparoscopic approach to ovarian cysts was fraught with controversy in the early 1990s owing to the concern that patients with ovarian cancer may be inadvertently missed or mismanaged with the laparoscopic approach⁽²⁰⁾. However, this problem can be minimised when careful pre-operative evaluation and selection of patients are combined with a disciplined and thorough intra-operative evaluation of the cyst and peritoneal cavity⁽²¹⁾. Our own experience suggested that that with careful pre-operative selection, the chance of encountering an expected malignancy is very low (<2%) and that these cancers can be diagnosed intra-operatively without any delay in the appropriate management of these cancers (unpublished data). It has been well demonstrated that the laparoscopic management of ovarian cysts allowed the patient all

the usual benefits of improved post-operative recovery when compared with the open surgery⁽²⁾.

The take-up rate of the laparoscopic approach for ovarian cysts, though also a relatively simple procedure, was not as rapid as that for treatment of ectopic pregnancies. It reached a level of approximately 50% level during the latter half of the decade. One of the reasons for this lower-than-expected impact was that consultants who were not trained in the technique were still uncomfortable with the new approach and tended to revert to the open approach except in the most straightforward cases.

For the advanced procedures such as myomectomy and hysterectomy, the impact of the minimal access approach was obviously more limited as these are level three procedures⁽²²⁾ and represented a much higher level of difficulty amongst the range laparoscopic procedures. This also means that only gynaecologists who have undergone additional advanced training were accredited to perform these procedures to ensure that the outcomes of these procedures were good and complication rates kept low.

Our selection of patients of patients for laparoscopic myomectomy were rather cautious for patients who desire to conceive subsequently as there was concern about the scar integrity and the possibility of a scar rupture in a subsequent pregnancy⁽²³⁻²⁵⁾. Great care was taken to ensure that meticulous repair of the uterine wound (with laparoscopic suturing) was carried out as one would by the traditional approach. A recent prospective randomised study comparing between laparoscopic myomectomy and abdominal myomectomy suggested that the obstetric outcome should be similar⁽²⁶⁾. To date, we have not experienced any incident of uterine dehiscence after laparoscopic myomectomy. Notwithstanding the slow take-up rate, laparoscopic myomectomy and hysteroscopic resection of submucous fibroids was able to reduce the percentage of laparotomy performed for the procedure from nearly 100% at the beginning of the decade to just about 70% by 1999-2000.

Laparoscopic hysterectomy with its attendant benefits to patient in terms of a quicker and less painful recovery⁽³⁻⁷⁾ should see much wider application. From a broader perspective, one of the important benefits of laparoscopic hysterectomy is the ability to reduce the overall need for abdominal hysterectomy⁽²⁷⁾. However, this was limited by the fact that it is a complex procedure and few gynaecologists were actually performing the procedure in the department. Hence, its impact appeared to be rather limited and the number of open surgeries performed for hysterectomy remained at an approximately 85% level. The percentage of vaginal hysterectomy was little affected over the study period.

The concept of minimal access surgery in gynaecology is not new, and in fact laparoscopy had its origins in gynaecology itself. However, the minimal access approach demands that the gynaecologists be trained in an entirely different discipline from open surgery as the hand-eye co-ordination is very different, and the margin for error is far smaller than in traditional open surgery. Hence, the ability to achieve a large impact on the practice of gynaecological surgery depends on how successfully we can train both qualified gynaecologists, as well as trainees in this new discipline. Whilst it is desirable to have the technique disseminated as widely as possible, it is even more important that those performing the procedures are adequately trained to achieve the good results with low complication rates.

The challenge for the future will be to have adequate provision for structured training within the gynaecology residency programme to equip the new generation of gynaecologists with the skills to perform these procedures well and safely, so as to confer the benefit of minimal access surgery to the broadest possible spectrum of people who need surgery.

REFERENCES

- Vermesh M, Silva PD, Rosen GF, Stein AL, Fossum GT, Sauer MV. Management of unruptured ectopic gestation by linear salpingostomy: a prospective randomised clinical trial of laparoscopy versus laparotomy. *Obstet Gynecol* 1989; 73:400-4.
- Yuen PM, Yu KM, Yip SK, Lau WC, Rogers MS, Chang A. A randomised prospective study of laparoscopy and laparotomy in the management of benign ovarian masses. *Am J Obstet Gynecol* 1997; 177 (1):109-14.
- Summitt RL Jr, Stovall TG, Steege JF, Lipscomb GH. A multicenter randomised comparison of laparoscopically assisted vaginal hysterectomy and abdominal hysterectomy in abdominal hysterectomy candidates. *Obstet Gynecol* 1998; 92(3):321-6.
- Ellstrom M, Ferraz-Naunes J, Hahlin M, Olsson JH. A randomised trial with cost-consequence analysis after laparoscopic and abdominal hysterectomy. *Obstet Gynecol* 1998; 91(1):30-4.
- Perino A, Cucinella G, Venezia R, Castelli A, Cittadini E. Total laparoscopic hysterectomy versus total abdominal hysterectomy: an assessment of the learning curve in a prospective randomised study. *Hum Reprod* 1999; 14(12): 2996-9.
- Falcone T, Paraiso MF, Mascha E. Prospective randomised clinical trial of laparoscopically assisted vaginal hysterectomy versus total abdominal hysterectomy. *Am J Obstet Gynaecol* 1999; 180(4):955-62.
- Marana R, Busacca M, Zupi E, Garcea N, Paparella P, Catalano GF. Laparoscopically assisted vaginal hysterectomy versus total abdominal hysterectomy: a prospective, randomised, multicenter study. *Am J Obstet Gynecol* 1999; 180(2):270-5.
- Shapiro HI, Adler DH. Excision of ectopic pregnancy through the laparoscope. *Am J Obstet Gynecol* 1973; 117(2):290-1.
- Bruhat MA, Manhes H, Mage G, Pouly JL. Treatment of ectopic pregnancy by means of laparoscopy. *Fertil Steril* 1980; 33(4):411-4.
- Mage G, Canis M, Manhes H, Pouly JL, Wattiez A, Bruhat MA. Laparoscopic management of adnexal cystic masses. *J Gynecol Surg* 1990; 6(2):71-9.
- Dubuisson JB, Lecuru F, Foulot H, Mandelbrot L, Aubriot FX, Mouly M. Myomectomy by laparoscopy: a preliminary report of 43 cases. *Fertil Steril* 1991; 56(5):827-30.
- Reich H, DeCaprio J, McGlynn F. Laparoscopic hysterectomy. *J Gynecol Surg* 1989; 5:2113-6.
- Canis M, Mage G, Manhes H, Pouly JL, Wattiez A, Bruhat MA. Laparoscopic treatment of endometriosis. *Acta Obstet Gynecol Suppl* 1989; 150:15-20.
- Donnez J, Nisolle M, Casana-Rous F, Bassil S, Anaf V. Rectovaginal septum, endometriosis or adenomyosis: laparoscopic management of 231 patients. *Hum Reprod* 1995; 10(3):630-5.
- Liu CY, Paek W. Laparoscopic retroperitoneal colposuspension (Burch procedure). *J Am Assoc Gynecol Laparosc* 1993; 1(1):31-5.
- Nezhat CR, Burrell MO, Nezhat FR, Benigno BB, Welander CE. Laparoscopic radical hysterectomy with paraortic and pelvic node dissection. *Am J Obstet Gynecol* 1992; 166 (3):864-5.
- Querleu D, Leblanc E, Castelain B. Laparoscopic pelvic lymphadenectomy in the staging of early carcinoma of the cervix. *Am J Obstet Gynecol* 1991; 164(2):579-81.
- Pouly JL, Manhes H, Mage G, Canis M, Bruhat MA. Conservative laparoscopic treatment of 321 ectopic pregnancies. *Fertil Steril* 1986; 46(6):1093-7.
- Lo L, Pun TC, Chan S. Tubal ectopic pregnancy: an evaluation of laparoscopic surgery versus laparotomy in 614 patients. *Aust NZ J Obstet Gynaecol* 1999; 39:185-7.
- Maiman M, Seltzer V, Boyce J. Laparoscopic excision of ovarian neoplasms subsequently found to be malignant. *Obstet Gynecol* 1991; 77(4):563-5.
- Canis M, Mage G, Pouly JL, Wattiez A, Manhes H, Bruhat MA. Laparoscopic diagnosis of adnexal cystic masses: a 12-year experience with long-term follow-up. *Obstet Gynecol* 1994; 83:707-12.
- Academy of Medicine (Singapore). Practice Guidelines on Gynaecological Endoscopic Procedures 1996.
- Harris WJ. Uterine dehiscence following laparoscopic myomectomy. *Obstet Gynecol* 1992; 80:545-6.
- Dubuisson JB, Chavet X, Chapron C, Gregorakis SS, Morice P. Uterine rupture during pregnancy after laparoscopic myomectomy. *Hum Reprod* 1995; 10(6):1475-7.
- Pelosi MA 3rd, Pelosi MA. Spontaneous uterine rupture at thirty-three weeks subsequent to previous superficial laparoscopic myomectomy. *Am J Obstet Gynecol* 1997; 177(6):1547-9.
- Seracchioli R, Rossi S, Govoni F, Rossi E, Venturoli S, Bulletti C, et al. Fertility and obstetric outcome after laparoscopic myomectomy of large myomata: a randomised comparison with abdominal myomectomy. *Hum Reprod* 2000; 15(12):2663-8.
- Loh FH, Canis M, Ng SC. Laparoscopic hysterectomy - A step forward? *Singapore Med J* 1995; 36:197-203.