REVIEW

Laparoscopic Treatment of Heterotopic Pregnancies: Benefits, Complications and Safety Aspects

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Received 19 December 2004; received in revised form 05 January 2005; accepted 31 January 2005

Abstract

Heterotopic pregnancy is an underestimated and increasing clinical condition. Laparoscopic surgery is currently the preferred treatment for ectopic pregnancy. While laparoscopic surgery is known for its many advantages, the use of this modality during pregnancy is still under debate. The aim of the present paper is to review the published literature on laparoscopic treatment of heterotopic pregnancy with special reference to its benefits, complications and safety. A total of 23 cases were evaluated and the results show that laparoscopic management is both feasible and safe. All surgical procedures were uncomplicated and all in utero pregnancies progressed normally.

Keywords: heterotopic pregnancy, laparoscopic surgery

Özet

Heterotopik Gebeliklerin Laparoskopik Tedavisi: Faydalar, Komplikasyonlar ve Güvenlik Boyutu

Heterotopik gebelik az görüldüğü sanılan ancak sıklığı gün geçtikçe artan bir klinik tablodur. Laparoskopik cerrahi günümüzde ektopik gebelik için tercih edilen tedavi şeklidir. Laparoskopik cerrahinin birçok avantajı bilinmesine rağmen bu modalitenin gebelikte kullanımı hâlâ tartışmalıdır. Bu çalışmanın amacı heterotopik gebelikte laparoskopik tedavinin özellikle faydaları, komplikasyonları ve güvenliği açısından yayınlanmış literatürü gözden geçirmektir. Toplam olarak 23 vaka değerlendirilmiştir ve sonuçlar laparoskopik yaklaşımın hem uygulanabilir hem de güvenli olduğunu göstermektedir. Yayımlanan laparoskopik cerrahi girişimlerde ciddi bir komplikasyon bildirilmemiş ve intrauterin gebeliklerin normal olarak gelişimine devam ettiği görülmüştür.

Anahtar sözcükler: heterotopik gebelik, laparoskopik cerrahi

Introduction

Heterotopic pregnancy, i.e. coexisting intra- and extrauterine pregnancy, has always been thought to be an extremely rare event with an estimated incidence of 1:30,000 (1). It has even been said in the literature that an intrauterine pregnancy would rule out an ectopic pregnancy. There is good evidence that this is no longer true. Recent studies have noted incidences of 1 in 8,000 and 1 in 2,600 in the general population, with numbers much higher in certain high-risk groups (2,3). In fact, in patients who receive assisted reproductive technologies, the incidence of heterotopic gestation reaches 1 in 100 (4).

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Over the last 20 years, operative endoscopy has revolutionized gynecology. Laparoscopic surgery is currently the preferred treatment for ectopic pregnancy. While laparoscopic surgery is known for its many advantages the use of this modality during pregnancy is still under discussion (5). The formerly common view that laparoscopic surgery is contraindicated during early pregnancy has been recently challenged; a great number of cases operated by pelvic or abdominal laparoscopy (mainly cholecystectomy, followed by adnexal surgery, appendectomy and other operations) are supporting the laparoscopic approach during pregnancy (6).

The aim of the present paper is to review the published literature on laparoscopic treatment of heterotopic pregnancy with special reference to benefits, complications and safety aspects of this management.

Review

A review of the published literature from 1990 and onwards was done using a computerized database (MEDLINE). Medical subject headings used were heterotopic pregnancy and laparoscopic surgery. This was supplemented by manual searching of references of original reports and review articles. Only reports with heterotopic tubal or cornual pregnancy were selected for further analysis.

Results

Available data on the patient´s characteristics, clinical presentation, treatment procedure, and pregnancy outcome are shown in Table 1. There were a total of 23 cases of laparscopically treated heterotopic pregnancies reported, all except one of them preoperatively suspected or known. One case was misdiagnosed as an ectopic singleton. The overall majority consisted of bleeding or ruptured ampullary tubal

Table 1. Review of literature describing laparoscopically treated heterotopic pregnancies

Location	EGA	Surgical procedure	Comments	Ref	Year
Bilateral ampullary	7	Bilateral salpingectomy	IVF, Term delivery	Hanf (7)	1990
Unruptured isthmic-ampullary with quadruplets	8	Salpingectomy	Multifetal pregnancy reduction at 11 weeks, Twin I VD, Twin II CS at 37 weeks	Phipps (8)	1991
Ampullary	7	Partial salpingectomy	Term delivery	Hirsch (9)	1992
Ruptured ampullary	8	Salpingectomy	CS at 37 weeks	Grauer (10)	1993
Bleeding ampullary	9	Partial salpingectomy	Term delivery	Bowditch (11)	1994
Ampullary	6	Partial salpingectomy	IVF	Parker (12)	1995
Bleeding ampullary	10	Salpingectomy	IVF, Term delivery	Remorgida (13)	1995
Ruptured interstitial with triplets	8	Cornua resection	PROM 33 weeks, Triplets, CS	Sherer (14)	1995
Bleeding ampullary	7	Partial salpingectomy	Term delivery, CS	Silva (15)	1995
Cornual	8	Cornua resection	Induction at 38 weeks	Vilos (16)	1995
Bleeding ampullary	8	Salpingectomy	IVF, Term delivery	Moosburger (17)	1996
Ruptured ampullary with twins	7	Salpingostomy	Induction at 37 weeks, Twins	Berliner (18)	1998
Unruptured tubal	7	Salpingectomy	IVF, VD at 38 weeks	Wang (19)	1998
Bleeding tubal	7	Salpingectomy	intrauterine pregnancy detected postoperatively, Term delivery	Ludwig (20)	1999
Bleeding ampullary	9	Salpingectomy	Term delivery, CS	Pschera (21)	2000
Ruptured ampullary	8	Salpingectomy	Term delivery	Diallo (22)	2000
Ruptured ampullary	8	Salpingectomy	Term delivery		
Ruptured tubal	9	Salpingectomy	IVF, VD at 33 weeks	Gruber (23)	2002
Ruptured tubal	11	Salpingectomy	IVF, CS at 37 weeks		
Ruptured ampullary	7	Salpingectomy	Term delivery		
Cornual	7	Cornuostomy	legal termination 2 days postop, patients decision	Pasic (24)	2002
Ruptured tubal with twins	7	Salpingectomy	IVF, VD at 38 weeks, Twins	Oliveira (25)	2002
Bleeding ampullary	10	Salpingectomy	Term delivery	Terzioglu (26)	2003

EGA: estimated gestational age in weeks, IVF: in vitro fertilization, VD: vaginal delivery, CS: Caesarean section, PROM: premature rupture of membranes

pregnancies of 6 to 11 weeks gestational age. All but one of these cases were treated with partial or total salpingectomy by use of either bipolar electrocoagulation or endoloop technique. In the remaining case salpingostomy with removal of the trophoblastic tissue was performed.

Three case reports describe an interstitial or cornual location of the ectopic pregnancy. In 2 of these cases cornua resection was performed by use of an endoscopic stapling device, intracorporeal loop ligatures, electrosurgery, and use of carbon dioxide laser, respectively. In the third patient laparoscopic cornuostomy was performed and the area of gestation evacuated. Hemostasis was controlled with unipolar and bipolar diathermy. No sutures over the incision were placed.

All intrauterine pregnancies progressed normally, and ended in deliveries of healthy babies with in three cases twins, and in one case triplets. Two days after laparoscopic surgery for a cornual ectopic, one patient, at her own request, had her intrauterine pregnancy terminated.

Discussion

This review clearly indicates that all tubal pregnancies irrespective of their location - even in the technically most demanding situations with interstitial or cornual location- can be successfully managed by laparoscopy with an uneventful course for the remaining intrauterine pregnancy. Undoubtedly, it may be assumed that this favourable outcome might be attributed to the fact that the laparoscopic procedures have been performed by well trained teams. Patient safety during surgery is of the highest priority and laparoscopic surgery has been shown to be safer when a surgical team works together on a frequent basis (27).

The ectopic component of heterotopic pregnancies is generally situated in the ampullary portion of the fallopian tube. There is agreement regarding the optimal surgical procedure in this situation as radical extirpation of the ectopic pregnancy was performed in all except one case. Conservative treatment by linear salpingostomy was considered by some authors (and performed by one) but rejected because the simultaneous presence of an intrauterine pregnancy would not have permitted the use of postoperative hCG titers to ascertain complete removal of the intratubal conception.

A cornual gestation, as described in three cases, is particularly hazardous since expansion of the gestational sac may not be immediately accompanied by symptoms until massive hemorrhage, hypovolemic shock, and maternal death result as sequelae to uterine rupture (28). These gestations present a surgical challenge to the gynecologist and it has been pointed out that an important limitation of the surgical procedure is the level of skill of the operating surgeon (29).

Since heterotopic pregnancy is relatively rare, the possibility of its occuring is often overlooked. Despite improved diagnostic possibilities the majority of ectopic implantations in heterotopic pregnancies will be diagnosed because of bleeding from the ectopic site as is also shown in the present study, the lowest detection rate described being about 10% (30). The main principle of management for heterotopic pregnancy is termintion of the extrauterine pregnancy as soon as the diagnosis is made in order to avoid the risk of rupture and intraperitoneal hemorrhage. Pregnancy, however, presents a challenge to all surgical management of abdominopelvic conditions because of the concern for maternal and fetal welfare (31). In this context laparoscopy is postulated as having a number of potential advantages over laparotomy (5). It must, however, be recognized that special circumstances, such as the size of the uterus, the fetus and physiological changes in the pregnant woman make laparoscopic surgery more difficult and increases the risk for complications.

During laparoscopic surgery, disturbance of the pregnant uterus is minimal. Videolaparoscopy provides magnification, good visualization and easy accessibility of structures, resulting in minimal blood loss and disturbance of adjacent structures. Uterine manipulation and the risk of drying from open exposure are minimized and this may decrease uterine irritability and the risk of postoperative abortion (32). Postoperative recovery is faster and early mobilization probably reduces the risk of thromboembolic complications. Reduced postoperative pain eliminates the need for potent narcotics and hence their sedative and emetic effects. Another advantage of laparoscopy is the elimination of an abdominal incision, thereby avoiding the discomforts of stretching and distension of a laparotomy scar due to the rapidly growing uterus. Additionally, the duration of hospitalization can usually be shortened and overall costs are less with laparoscopic adnexal surgery (33).

A general lack of information in most previous reports concerns the position of the patient during the laparoscopic procedure. In the authors´ opinion laparoscopy during pregnancy is best performed with the patient in the supine position. The conventional dorso-lithotomy position should be avoided as in no case should instruments be introduced vaginally into the uterus or applied to fix the cervix as is done on a nonpregnant uterus. The lithotomy position may also cause undue pressure on the legs, thereby increasing the risk of deep vein thrombosis to which pregnant women are more susceptible (34).

In the pregnant state, extreme care must be exercised when placing the insufflation needle and cannulas to avoid injuring the uterus, as perforation could result in ruptured membranes, bleeding, infection, or gas embolism (5,35). Such complications can easily be avoided by choosing an appropriate entry site for the Veress needle. In the first trimester the usual umbilical site can be used. With advancing pregnancy, however, an entry site far away from the uterus would be more suitable. The subsequent trocars can then be introduced under direct

vision. Perioperative complications such as bleeding, bowel perforation or injury of the ureter are often difficult to treat. However, an overlooked peroperative complication, diagnosed postoperatively, could be extremely serious during pregnancy. Furthermore, atypical clinical symptomatology may further delay adequate management. Thus, careful postoperative surveillance is essential.

There is concern about CO_2 inflation of the peritoneal cavity and its effect on the fetus. Most of the studies performed in animals have confirmed the clinical suspicion that CO_2 pneumoperitoneum can produce significant alterations in maternal and fetal blood gases (36,37). The significance of these transient effects remains unclear, although a recent study suggests that these physiologic effects may have long-term fetal consequences, i.e. hyperactivity in neonatal offspring (38). Although the extrapolation of these results to humans lacks scientific basis, these findings do point to the need for additional study of this vitally important issue. These studies further confirm the lack of adverse effects of intraabdominal CO_2 pressures under 15 mmHg on the fetal placental perfusion and blood gases. As the absolute safety of this procedure during pregnancy still has to be established, potential effects of CO_2 pneumoperitoneum may be minimized by maintaining the intraabdominal pressure below 15 mmHg. Thus it is possible not only to prevent ventilatory and circulatory problems but also the risk of gas embolism, a rare and potentially lethal complication (39). In the authors´ experience, adequate exposure is still possible with less pneumoperitoneum, and does not prevent operative laparoscopy. Recently, gasless laparoscopy has been shown to be a safe alternative to conventional laparoscopy for pregnant patients (40).

Apart from CO_2, anesthetic drugs that are administered during the first trimester of pregnancy may cause abnomalities during the period of organogenesis. Such objections are contradicted by a Swedish registry study for the years 1973 to 1981 covering 720 000 pregnant women. Of these 5.405 underwent surgery (operation rate 0.75%), mainly diagnostic laparoscopy (34%). According to this study, it appears that general surgery in pregnancy causes no increase in stillbirths or birth defects and results in no difference in time or type of delivery compared with controls, but leads to increased infant mortality and lower birthweight. These authors concluded that the causes were related more to the mother´s illness that required surgical treatment than to surgery or anesthesia (41).

Concluding remarks

From the lack of complications in the hitherto published reports it can be concluded that endoscopic management seems to be the appropriate modality both for diagnosis and immediate treatment of tubal and cornual heterotopic pregnancy. However, as long as even only minimal concerns remain regarding its safety, it has been suggested that prospective, controlled, randomized studies should be conducted in order to assess the superiority of pelvic laparoscopy over laparotomy in pregnant women (42). Given the limited number of cases, such a study seems difficult to perform.

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