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Suitable laparoscopic surgery in the treatment of ectopic interstitial pregnancy

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Abstract Interstitial or cornual pregnancies represent a small fraction of ectopic gestations. They are located in the interstitial part of the fallopian tube. Interstitial pregnancies are especially feared due to their associated life-threatening intra-abdominal haemorrhage. General guidelines for clinical management are lacking. This article describes important specialities in the differentiation between interstitial and classical tubal pregnancies and will further offer a special minimally invasive procedure for the safe management of this rare type of ectopic pregnancy. We favour a special endoscopic operative procedure using a combination of the encircling suture and endoloop techniques. This method provides an excellent tourniquet effect resulting in effective haemostasis. In addition to the different endoscopic treatments, other therapeutic options, such as primary methotrexate application, will be discussed.

Keywords Interstitial pregnancy · Cornual pregnancy · Laparoscopy

Introduction

Today there has been a significant increase in ectopic pregnancies worldwide. The incidence of ectopic pregnancies ranges between 1 and 2% of all gestations. However, nearly 96% are located in the fallopian tube, mainly in the isthmo-ampullary part [1, 2]. Only 2–4% of all ectopic pregnancies develop in the interstitial part of the fallopian tube. Interstitial or cornual pregnancy implants precisely in the interstitial region of the fallopian tube where it passes through the uterine wall (Fig. 1). This location leads to two major problems. First, interstitial pregnancy is often diag-

nosed later in the course of gestation. Second, it is directly located in the “delta” of the ramus ascendens of the uterine artery. These special factors explain the significantly higher risk of haemorrhage in contrast to classical tubal pregnancies. Moreover, interstitial pregnancies account for approximately 20% of the deaths attributed to ectopic gestation in the United States [3]. Overall, interstitial pregnancy is diagnosed once every 2,500–5,000 live births [4, 5]. Traditionally, the surgical treatment of choice was primary laparotomy, performing cornual resection or hysterectomy. In the past 20 years due to tremendous progress in the development of endoscopic surgery and the therapeutic option of methotrexate, minimally invasive management is of striking importance. The surgical basics of laparoscopic treatment are cornual incision, extraction of the conceptus and sufficient haemostasis. Today there is no standard procedure; no “gold standard” in managing ectopic interstitial pregnancies has been established. Therefore, every doctor dealing with women’s health should be aware of the problems associated with this ectopic condition.

Diagnosis

The risk factors for interstitial pregnancy do not differ from those for classical tubal pregnancy. Pathogenetically, the most important risk factor is impaired tubal function. All conditions leading to impaired tubal function, namely chronic pelvic inflammation, endometriosis or tubal surgery, lead to an increased risk of ectopic pregnancy. Table 1 gives an informative overview of the risk factors [6].

In the past, diagnosis of ectopic pregnancy was made by clinical examination in addition to culdocentesis, a diagnostic procedure that is nearly forgotten worldwide and only older colleagues still know about this examination. Nowadays, a more sophisticated preoperative diagnosis could be made using sensitive pregnancy tests and transvaginal ultrasound. Unfortunately, there are no adequate diagnostic procedures to reliably differentiate between interstitial or tubal pregnancies. Moreover, the differentiation between interstitial or other ectopic pregnancies can

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Fig. 1 Left-sided interstitial ectopic pregnancy

be very difficult. In only a few cases slight differences might be detectable. These diagnostic problems lead to the unfavourable situation that almost all cases of interstitial pregnancy are diagnosed after the patient is symptomatic [6]. The most frequent symptoms are abdominal pains, abnormal vaginal bleeding, amenorrhoea and shock resulting from the haemorrhage of uterine rupture. In the laboratory, urine and blood samples will be tested positive for hCG. For hCG testing in blood samples there exists a useful cut-off level, improving diagnostic safety; if hCG levels exceed 1,500 mU/ml the pregnancy or the gestational sac must be seen in the uterus sonographically; if not a suspicion of ectopic pregnancy must arise, with further therapeutic consequences [1, 7]. Due to favourable technical equipment in our department we lowered this cut-off level to 800–1,000 mU/ml, leading to further improvement of diagnostic and therapeutic safety.

In interstitial pregnancies, due to the later time of diagnosis, higher serum hCG levels can be detected. In unpublished data we found a 2- to 3-fold increase in serum hCG levels in interstitial pregnancies compared with tubal gestation. These remarkably higher serum hCG levels must

Table 1 Risk factors for ectopic pregnancy [6]

Risk factor	Odds ratio
High risk	
Tubal surgery	21.0
Sterilisation	9.3
Previous ectopic pregnancy	8.3
In-utero exposure of diethylstilboestrol	5.3
Use of IUD	4.2–45.0
Documented tubal pathology	3.8–21.0
Moderate risk	
Infertility	2.5–21.0
Previous genital infections	2.5–3.7
Multiple sexual partners	2.1
Slight risk	
Previous pelvic/abdominal surgery	0.9–3.8
Cigarette smoking	2.3–2.5
Vaginal douching	1.1–3.1
Early age of first intercourse (< 18 years)	1.6

Table 2 Sonographic findings in classical tubal pregnancy (transvaginally)

Finding	Incidence (%)
“Empty” uterus, thick endometrium	80
Blood in the cul-de-sac	70
Echo-free round structure in the region of an ovary	50
Gestational sac with fetus, heartbeat visible in the region of an ovary	10

increase the attention paid to vaginal ultrasound examination. Typical sonographic signs of ectopic pregnancy are given in Table 2. The vaginal ultrasound examination in ectopic tubal pregnancies shows rather unspecific signs and it must be emphasised that in only 10% can a proper diagnosis of ectopic pregnancy be made. This means that in 90% of the cases diagnosis has to be made by carefully examining three parts. The diagnostic “puzzle” includes clinical signs and symptoms, laboratory procedures and vaginal ultrasound.

Sonographic findings in interstitial gestation will be similar to those of tubal pregnancies. The major finding is the empty uterus covered with a thick layer of endometrium; but this is not the whole truth. In interstitial pregnancy a far more excentric location of the gestational sac can be detected. Typically, the excentric gestational sac is surrounded by a thin layer of myometrium. The detection of these ultrasound findings will further emphasise the possibility of an interstitial ectopic pregnancy (Fig. 2).

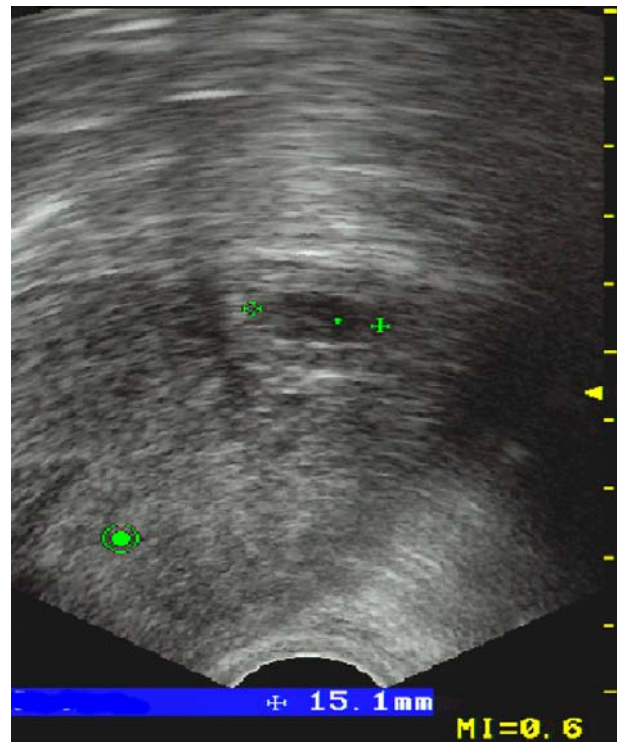


Fig. 2 Sonographic picture of an ectopic interstitial pregnancy



Fig. 3 Encircling suture around the base and incision into the interstitial part of the fallopian tube



Fig. 5 Final situs

Therapy

In the past, routine laparotomy, performing cornual resection or hysterectomy, was commonly used in the management of ectopic interstitial pregnancies. Today, due to advances in endoscopic operative technology minimally invasive treatment is possible. The operative procedure in laparoscopic surgery must not differ from open surgery with regard to safety and quality aspects for the patients. The operative strategy is similar in both routes. The basics of laparoscopic treatment are the cornual incision, extraction of the conceptus and sufficient haemostasis. In interstitial pregnancies, because of the far higher risk of haemorrhage, safe haemostasis is of striking importance. Every surgeon should avoid using the same operative procedure for interstitial and tubal pregnancies. In interstitial pregnancies this operative management could cause severe intraoperative haemorrhage, leading to a high percentage of emergency laparotomies. Noteworthy in this context is that interstitial pregnancy is still one of the leading causes of death associated with ectopic pregnancies

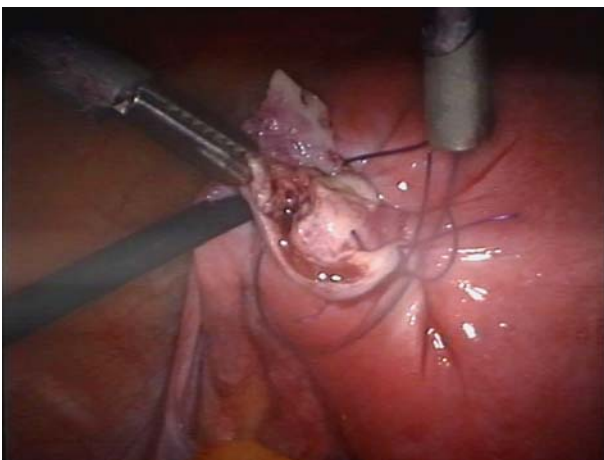


Fig. 4 Endoloop procedure for ensuring haemostasis

[3]. For safety reasons, modification of operative treatment is needed. Many successful laparoscopic managements for early interstitial pregnancies have been reported [8–14]. According to previous reports most authors have used electric cauterisation for bleeding control and cornual incision [10, 14, 15]; also cornual excision has been performed by others [11, 13]. In our opinion, an easy and safe laparoscopic method has been described by Moon et al. [9]. We have had favourable experiences in modifying these operative methods, leading to sufficient bleeding control. First, we perform an encircling endoscopic suture around the base of the interstitial pregnancy. Second, the encircling suture must be tied, producing a tourniquet effect. Third, while keeping the tension on the knot a cornual incision can be made and the conceptus can be removed (Fig. 3). To ensure safe haemostasis we place an endoloop around the knot (Fig. 4). This procedure leads to secure haemostasis. However, this procedure interrupts the fallopian tube (Fig. 5). In general, after surgery several determinations of serum hCG levels should be performed to ensure the efficacy of the therapy.

Discussion

Interstitial ectopic pregnancies represent nearly 3% of all ectopic gestations. The major problem with this clinical presentation is the significantly higher risk of severe haemorrhage due to the mostly later time of diagnosis and the development in the interstitial part of the fallopian tube. The diagnostic problem preoperatively leads to the unfavourable fact that most cases will first be diagnosed during surgery. However, the same operative handling of tubal and interstitial pregnancies should be avoided, as this may lead to a high percentage of major life-threatening complications.

With regard to resolving the problem of sufficient haemostasis, different operative approaches are described. A review of the literature shows that some colleagues prefer electric cauterisation before incision of the cornual part

[10, 11, 13–15]; cornual resection is also described. Moon and colleagues found the combination of vasopressin injections and cauterisation in early ectopic pregnancies with an gestational sac of 7 mm helpful [9]. Managing more advanced pregnancies by this approach seems to be risky, leading to significant blood loss in some cases [9]. Confino and Gleicher had positive results concerning bleeding control when performing several ligatures around the base of the pregnancy before the cornual incision was made [8]. Using this operative procedure blood loss could be minimised. A modified method of safe haemostasis is described by Moon et al., comparing three different operative techniques [9]. They obtained favourable haemostasis by using the endoloop technique or an encircling suture around the base of the cornual pregnancy before incision and extraction of the conceptus were performed. Moon et al. performed the encircling suture technique when the size or shape of the ectopic pregnancy did not allow successful application of the endoloop [9]. Every surgeon familiar with laparoscopy knows about the critical part of endoloops. They tend to slip; mainly in those cases little tissue is available to ensure closure. This is exactly the problem in some cases when performing laparoscopic surgery in interstitial pregnancy. We therefore tend to combine the encircling suture and endoloop techniques in interstitial pregnancies. In the study by Moon et al., the endoloop and the encircling suture technique was more effective in controlling bleeding than the application of vasopressin and electric cauterisation. Blood loss differed significantly between the groups. Moreover, the duration of surgery using endoloop or encircling suture was significantly shorter, reflecting the simplicity of these operative methods [9].

Fortunately, interstitial pregnancy is a rare event; due to this fact little is known about the treatment of choice. In the study by Moon et al., which described a considerable number of 24 patients with interstitial pregnancies, only 3 patients were treated by encircling suture, whereas 15 patients underwent the endoloop procedure. Therefore, general guidelines are still lacking. As an alternative to surgery, medical management for the treatment of interstitial ectopic pregnancy has been applied [16–21]. Mostly methotrexate is used, but in administering methotrexate several problems must be considered; a close medical follow-up has to be performed after its application. According to the current literature, after a single shot of methotrexate a 15% decline in serum hCG measured on day 4 and day 7 should be reached [22]. It is noteworthy that a regular decline in serum hCG levels is not always associated with the resolution of ectopic pregnancy. Rupture of the ectopic pregnancy can still occur, resulting in severe intra-abdominal haemorrhage, which is a life-threatening event, especially in interstitial pregnancy [23–25]. It has been a clinical experience that after application of methotrexate diffuse self-limiting abdominal pain can occur, imitating rupture of ectopic pregnancy [26]. Furthermore, there exists a medical report concerning uterine rupture in future pregnancies [27]. For these reasons, combined with the knowledge of possible life-threatening haemorrhages, we prefer planned surgical treatment for the management of

interstitial ectopic pregnancies. In our laparoscopic department we perform a combination of the endoscopic techniques described. We have had favourable experiences concerning effective and safe bleeding control in interstitial pregnancies by first making an encircling suture around the base of the pregnancy and second, ensuring haemostasis by placing an endoloop. Some colleagues may not agree that the combination of both, suture and endoloop, is necessary. In our opinion, every suture or endoloop that can avoid major bleeding complications—even in rare cases—is helpful and necessary.

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