

Cornual patency and integrity following laparoscopic cornuotomy for interstitial pregnancy

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ABSTRACT

Objective: To evaluate cornual patency and integrity following laparoscopic cornuotomy. **Study Design:** This is a prospective cohort study on seven women who underwent laparoscopic cornuotomy for interstitial pregnancy. The cornual patency and integrity were evaluated using hysterosalpingography (HSG) and magnetic resonance imaging (MRI). On MRI, the entire cornual wall thickness was measured bilaterally at 5-mm intervals. The thickness of the affected and unaffected cornua matched at the corresponding contralateral point in each of the women. Statistically, all possible pairwise 28 comparisons were compared using *paired t*-tests. **Results:** Among six eligible women, four women had excellent cornual patency on the affected side. Among seven women (*i.e.*, 28 pairs), no significant difference was observed in cornual thickness compared to the unaffected cornu and no remarkable defects were seen in the endometrial and cornual contour. But there is no statistical significance. **Conclusion:** Laparoscopic cornuotomy seems to have advantage to preserve the cornu in interstitial pregnancy.

Keywords: Interstitial Pregnancy; Cornual Pregnancy; Cornuotomy; Outcome; Cornual Integrity

1. INTRODUCTION

Interstitial pregnancy refers to an ectopic pregnancy which the fertilized ovum is implanted in the interstitial segment of the fallopian tube. This rare entity can trigger a life-threatening hemorrhage due to the anatomical features of the interstitial segment but that is mere beginning of successive disasters such as reduced fertility or uterine rupture in the subsequent pregnancy. In the last two decades, various conservative management methods have been investigated and advanced in treating interstitial pregnancy [1-8]. But our greatest concern is how to minimize the additional destruction of the innate fertile structure beyond minimal invasiveness. We introduced a

modified laparoscopic surgical technique for interstitial pregnancy in the preceding paper. The method terminated the interstitial pregnancy without major complications and had potential probability for preservation of the affected cornu and salpinx [9]. In this study, we present the cornual patency and integrity after laparoscopic cornuotomy for interstitial pregnancy.

2. MATERIALS AND METHODS

This is a prospective cohort study on seven of eight women who underwent laparoscopic cornuotomy for interstitial pregnancy at Eun Hospital between February 2005 and November 2006. As described in the preceding paper, the laparoscopic cornuotomy was performed using a temporary tourniquet suture with injection of diluted vasopressin. Sufficient diluted vasopressin was injected around the cornual mass and a circumferential intramyometrial tourniquet suture was made around the medial part of the protruding mass. After placement, the two ends of the suture were tightened and a knot was tied while maintaining tension to produce a tourniquet effect. Additional dilute vasopressin solution was injected into the protruding cornual mass. Then, the cornua was incised, the conceptus evacuated, and the cornua repaired. Finally, the tourniquet suture was cut and removed completely after the cornual repair [9].

The contour of the endometrial cavity and cornual patency were evaluated using hysterosalpingography (HSG), and the cornual integrity was assessed with magnetic resonance image (MRI). Images were obtained between 3 and 25 months postoperatively and interpreted by a radiologist blinded to the clinical data, except for name and age. Cornual patency could not be evaluated on HSG in two women: case no. 6, who had undergone a previous ipsilateral salpingectomy for tubal pregnancy, and case no. 8, who was lost to follow-up. The cornual integrity could not be evaluated on MRI in one woman: case no. 8, who was lost to follow-up.

On axial and coronal views of T1- and T2-weighted images, the entire cornual wall thickness was measured

bilaterally at 5-mm intervals and the entire cornual contour was observed closely. The thickness of the affected and unaffected cornua matched the corresponding contralateral point in each of the women. Statistically, all possible pairwise comparisons of the seven patients (*i.e.*, 28 pairs) were made using paired *t*-tests.

3. RESULTS

Figures 1 and 2 are HSG and MRI respectively that were obtained after 3 months postoperatively (case no. 2).

As shown in **Figure 1**, both tubes are patent (arrowheads) and that contrast material spills into the peritoneal cavity (open arrow). Small internal projection (straight arrow) is revealed on the affected right proximal cornu, but is negligible in terms of the overall cornual patency. In **Figure 2**, arrowhead and open arrow indicate the affected cornu. There are no significant differences in the thickness of the affected and unaffected cornu, and no defects in terms of the overall cornual contour.

As shown in **Table 1**, four of the six eligible women (two women were excluded: case no. 6, who had undergone a previous ipsilateral salpingectomy for tubal pregnancy, and case no. 8, who was lost to follow-up) had excellent cornual patency on the side affected by the interstitial pregnancy on HSG, while tubal occlusion at the affected proximal cornu occurred in the remaining two



Figure 1. HSG that was obtained 3 months following laparoscopic cornuotomy for interstitial pregnancy. Notice that both tubes are patent (arrowheads) and that contrast material spills into the peritoneal cavity (opened arrow). Small external dimpling (straight arrow) is revealed on the affected right proximal cornu, but is negligible in terms of the overall cornual patency (case no. 2).

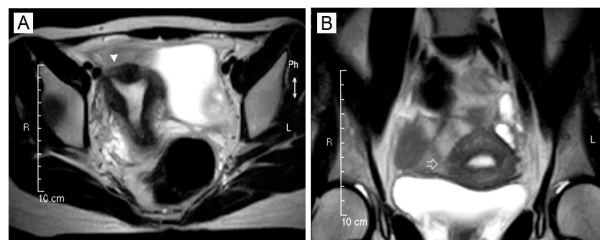


Figure 2. Magnetic resonance images that were obtained 3 months following laparoscopic cornuotomy for interstitial pregnancy. (A) Axial view on the T2-weighted image; (B) Coronal view on the T2-weighted image. The arrowhead and opened arrow indicate the affected cornu. Note that there are no significant differences in the thickness of the affected and unaffected cornu, and no defects in terms of the overall cornual contour (case no. 2).

women (cases no. 1 and 4). Two women (cases no. 2 and 5) had small internal projection at the affected cornu, but these were negligible in terms of the overall cornual patency. No remarkable distortion of the endometrial cavity was detected and the endometrial contour was maintained.

In cornual thickness category of **Table 1**, the top and bottom lines indicate the thicknesses of the affected and corresponding contralateral unaffected points on MRI respectively. The difference in cornual thickness was not significant and no remarkable defects in the overall cornual contour were observed. But there is no statistical significance. The lack of statistical significance probably resulted from the small sample size ($p = 0.49$, paired *t*-test).

4. DISCUSSION

Laparoscopic surgery is the preferred surgical approach for a variety of gynecologic conditions.

Although the laparoscopic assessment of interstitial pregnancy was once deemed hazardous due to the anatomical features of the interstitial segment but that is far from the fact today. Moreover, concern has shifted from minimal invasiveness toward minimizing the subsequent effects on the patient's fertility [5-9].

Moon and colleagues reported their laparoscopic techniques and the outcomes using an encircling suture and endoloop ligation. Their techniques were very worthy in terms of technical simplicity and effectiveness; in addition, they reported subsequent pregnancy after long-term follow-up and clinical outcomes including the cornual state through Caesarean section at full term [8]. To our knowledge, this is the first report on the outcomes of subsequent pregnancies after the conservative management of interstitial pregnancy. But in their procedures, affected cornu were ligated and the encircling suture or endoloop was left intact, consequently, the affected cornu and salpinx was sacrificed anatomically or functionally

Table 1. Summary of the cornual patency and integrity the patients who underwent laparoscopic cornuotomy for interstitial pregnancy.

Case No.	HSG			MRI				Overall cornual contour
	Endometrial cavity contour	Cornual patency	Cornual contour	Thickness of cornu (mm)				
				Affected side (top)				
				Unaffected side (bottom)				
1	NS ^a	occluded		12	14	15	18	no defect
				12	14	16	18	
2	NS	patent	small internal projection	12	15	15	19	no defect
				12	15	18	19	
3	NS	patent	NS	10	12	15	20	no defect
				10	12	14	20	
4	NS	occluded		13	15	18	20	small dimple
				13	15	17	20	
5	NS	patent	small internal projection	10	12	18	20	no defect
				10	12	18	20	
6	NS	NA1 ^b	NS	12	14	16	19	no defect
				13	14	15	19	
7	NS	patent	NS	10	12	17	20	no defect
				11	13	17	20	
8	NA2 ^c	NA2	NA2	NA2				NA2
<i>p</i> = 0.49 ^d								

 $p = 0.49^d$ (a) NS: non-specific; (b) NA1: non-applicable 1 due to previous salpingectomy; (c) NA2: non-applicable 2 due to lost to follow up; (d) Paired *t*-test.

[8]. In contrast, with our technique, the tourniquet suture was cut and removed completely after the cornual repair, so that it did not interfere with the blood supply or patency of the affected cornu and salpinx and get a potential opportunity for preserving their function [9].

An alternative form of noninvasive management is medical treatment, which includes systemic or local methotrexate, KCl, hypertonic dextrose, prostaglandins, or actinomycin D. Although no controlled study has determined the superior drug, methotrexate is most often used in medical treatment. Methotrexate treatment is noninvasive, but has several disadvantages, including the need for prolonged close follow-up and an overall success rate of only 83% (91% with local injection, 79% with systemic injection) [5]. Treatment failure can trigger life-threatening hemorrhage; furthermore, the Methotrexate has teratogenic effects in subsequent pregnancies and cannot be used to treat hemodynamically unstable women [1-5,10,11].

Our study has several limitations as follows; it was an uncontrolled study, with a small number of cases. In ad-

dition, no information was available on the distended pregnant uterus. If a subsequent caesarean section were required at full term, evaluation of the uterine integrity precisely would be possible. However, we have not yet encountered this situation. Assessing the anatomic reproductive capacity, especially the myometrial integrity using MRI, may not be sufficient. Nevertheless, as previously reported, MRI has demonstrated uterine defects in previous Caesarean scars and HSG is considered the gold standard for imaging the endometrial contour and tubal patency [12-14]. Therefore, these imaging techniques have proven to be valuable, alternative, noninvasive tools for evaluating the endometrial contour, myometrial integrity, and tubal patency.

In our series, the tube in the affected proximal cornu was occluded in two women (cases no. 1 and 4). After reviewing the videotapes of the two women, we found that accidental tubal ligation occurred due to excessive lateral extension and deep needle penetration during the cornual repair in both cases. Meticulous full-thickness suturing is very important for hemostasis and maintain-

ing uterine integrity, but excessive deep needle penetration can cause accidental tubal ligation. Consequently, careful repair of the proximal cornu is very important for avoiding iatrogenic tubal injury.

Interestingly, the right cornu was involved in all cases, but whether an unknown pathophysiology was at play or this was mere coincidence is uncertain. In addition, the superiority of a transverse versus vertical incision has not been determined. A transverse incision can be extended laterally if needed and it reduces blood vessel injury because the direction parallels the cornual collateral vessels; however, this direction may induce iatrogenic tubal injury.

Since interstitial pregnancy is very rare, a worldwide registry is needed to verify the efficiency and outcome of various treatment methods. This registry should include prospective long-term follow-up data on patients with interstitial pregnancy and retrospective data on pregnant women who have been managed previously. With the accumulation of clinical data and large-scale studies such as meta-analyses, many questions can be answered.

Three of our multiparous women conceived 12, 17, and 40 months after the surgery, respectively and, to our surprise, all were delivered safely via the vaginal route at full term. One nulliparous woman conceived 30 months after the surgery, but she was lost to follow-up after 30 weeks of pregnancy.

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