

Ectopic pregnancies in Caesarean section scars: 5 years experience

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ABSTRACT

Purpose: our aim is to evaluate our 5 years experience in diagnosis and treatment of ectopic pregnancy developing in a Caesarean section scar.

Subjects & Methods: The study included twenty one women who were diagnosed with a Cesarean scar ectopic pregnancy (CSEP) in the first trimester, which was confirmed by ultrasound and treated in our hospital during 5 years between 2012 and 2016. The clinical presentations, imaging findings, and treatment outcomes of all these pregnancies were recorded.

Results: All our 21 cases underwent successful early first trimester diagnosis with trans-vaginal color Doppler ultrasonography and termination by a systemic methotrexate administration, or with aspiration of the gestational sac. Fourteen of them underwent systemic methotrexate treatment; and seven patients underwent trans-cervical aspiration of the gestational sac. Intra-operative bleeding occur in all 7 cases that treated with aspiration of the gestational sac, one of them end with hysterectomy. Uterine rupture occurs in one patient and treated conservatively. No complications occur in cases treated with systemic methotrexate injection. The cesarean scar

mass followed with trans-vaginal ultrasound and regressed from 2 months to about 1 year after treatment.

Conclusion: Early imaging recognition, diagnosis of CSEP and effective treatment is critically important to improve outcome, minimize the need for emergency extended surgery, minimize maternal complications, maintain treatment options, and potentially preserve future fertility.

Keywords: Cesarean pregnancy; Cesarean scar ectopic pregnancy; CSEP; trans-vaginal sonography, methotrexate.

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INTRODUCTION

In the last decade, the rates of Cesarean delivery (CD), Cesarean scar pregnancy (CSP) and the different degrees (accreta, increta and percreta) of morbidly adherent placenta (MAP), also known as placental attachment disorders, have increased in a parallel fashion (1-2).

The incidence of cesarean scar pregnancy is 1 in 2000 pregnancies and it accounts for 6 percent of ectopic pregnancy in women with history of Cesarean delivery (3-4).

The pregnancy is located in the scar and is surrounded by myometrium and connective tissue. The mechanism for implantation in this location is believed to be migration of the embryo through either a wedge defect in the lower uterine segment or a microscopic fistula within the scar (5-6).

Risk factors include the following adenomyosis, in vitro fertilization, previous dilation and curettage, and manual removal of the placenta (3-5-7).

Most of patients are asymptomatic; however, in symptomatic patients the clinical presentation ranges from vaginal bleeding with or without pain to uterine rupture and hypovolemic shock (8-9-10).

Implantation of a pregnancy within a Caesarean fibrous tissue scar is considered to be the rarest form of ectopic pregnancy and a life-threatening condition (11). This is because of the very high risk for uterine rupture and all the maternal complications related to it (12-13-14).

The diagnosis is made by sonographically visualizing an enlarged hysterotomy scar with an embedded mass, which may bulge beyond the anterior contour of the uterus (15-16). Other findings include presence of trophoblast between the bladder and the anterior uterine wall, no fetal parts in the uterine cavity, absence of myometrium between the gestational sac and the bladder, Doppler evidence of perfusion of the peri-trophoblastic vasculature, and discontinuity of the anterior uterine wall in the sagittal plane. (9-17-18) Attention should be directed at determining the extent of invasion into adjacent pelvic structures, such as the bladder. Magnetic resonance imaging and hysteroscopy have been used to further evaluate pregnancy location, but are not mandatory for making the diagnosis (19-20-21-22).

Management options include wedge resection of the ectopic pregnancy with laparotomy or laparoscopy, hysteroscopic excision, local injection of 5 mEq [potassium chloride](#) into the sac, and local or systemic [methotrexate](#) administration, local administration is preferable if fetal cardiac activity is still present (19-18-23-24).

Another option of management is suction curettage that were pretreated with either uterine artery embolization (UAE) or systemic methotrexate (25) A relatively new approach is use of hysteroscopy to remove cesarean scar pregnancies under direct visualization (24).

In this study, we present our hospital experience of 21 ectopic pregnancies implanted in Caesarean scars, in whom first-trimester diagnosis of CSP was well documented and established and who elected to terminate the pregnancy either with systemic methotrexate injection or aspiration of the gestational sac. We detail the diagnostic process and present their sonographic findings, clinical course, and outcome.

SUBJECTS AND METHODS

We identified 21 patients with CSP, presenting during a 5-year period to our centers.

All patients were counseled extensively about the diagnosis and were offered termination of the pregnancy by one of the following methods: medical treatment with systemic injection of methotrexate; or surgical treatment (aspiration of the gestational sac).

Local intra-gestational injection of methotrexate, open surgery and uterine artery embolization (UAE) not used in our study to terminate CS pregnancy.

All patients agreed to this management plan. They were followed with serial ultrasound scans at 2–4-week intervals and, in some cases, with magnetic resonance imaging, as well as the customary pregnancy monitoring. Charts, serial ultrasound images, operative reports and histopathological examinations of these 25 patients were collected prospectively and were reviewed retrospectively for our study.

The dose of methotrexate is 50 mg per square meter of body surface area; follow up with human chorionic gonadotrophin (b-hCG) level at day 4 and day7, after treatment. Another dose of systemic methotrexate (maximum 3 doses) will give to the patient if day 7 b-hCG level is increasing, plateauing or decreasing but with a value less than 15% than its day 4 level.

However if there is good response (15% or more decrease of day 7 b-hCG level), no further dose will be given to the patient.

Follow up was done afterward with b-hCG weekly till it become normal level (less than 5mIU/mL. Weekly trans-vaginal Doppler ultrasound follow up of the scar mass and its vascularity was also done.

The ultrasound diagnosis of a CSP was established using sonographic features including;

- (1) An empty uterine cavity and an empty endocervical canal.
- (2) The placenta and/or a gestational sac embedded in/on a hysterotomy scar.
- (3) In early gestations (<8weeks), a triangular gestational sac filling the niche of the scar; at >8weeks (all gestational ages in this paper are postmenstrual weeks) this shape may become rounded or even oval.
- (4) A thin (1–3-mm) or absent myometrial layer between gestational sac and bladder.
- (5) A closed and empty cervical canal.
- (6) An embryonic/fetal pole and/or yolk sac with or without heart activity.

(7) A prominent and at times rich vascular pattern at or in the area of a Cesarean scar in the presence of a positive pregnancy test. (26-27).

Trans-vaginal Ultrasound examination done using an ultrasound machine (Ultrasonix –Analogic ultrasound system) with (C5-2/60 MHz) trans-vaginal probe with pulsed and color Doppler used to monitor sub-trophoblastic blood flow velocity.

Charts, serial ultrasound images, operative reports and histo-pathological examinations of these 21 patients were collected prospectively and were reviewed retrospectively for this study.

RESULTS

Twenty one patients were included in our study; this research was approved by the institutional review board of the hospital.

Table showing 1 details demographic and clinical data, type of termination of pregnancy and outcome results of 21 patients with Cesarean scar pregnancy

The average age of the patients was 31.9 (range, 20–41) years.

24 % (5/21) of our patients had only one prior cesarean section, 43 % (9/21) had 2 prior C.Ss, 28 % (6/21) had 3 prior C.Ss and only 5%, (1/21) had 4 prior C.Ss.

Four of our patient (4/21) had history of pelvic inflammatory disease and no history of intrauterine contraceptive devices (IUCD) in all our cases.

The ultrasound diagnosis of CSP was made as early as 6: 8weeks, the age at first ultrasound examination ranged from 6+1 weeks to 7+3weeks.

14 of 21 patients treated with systemic injection of methotrexate administration and 7 patients treated surgically with aspiration of the gestational sac. Maximum doses 2;3 doses.

All 14 cases (14/21) that treated with systemic injection of methotrexate showing no complications, however, all 7 patients (7/7) that treated with aspiration of gestational sac showing intra-operative bleeding and insertion of folly's catheter in the uterine cavity . Five of patients (5/7), bleeding was controlled with removal of the uterine catheter after 24 hours.

The other two of them (2/7) had perforation of the uterus at the site of previous caesarian scar with subsequent pelvic hematoma. One of them end by hysterectomy due to uncontrolled bleeding, the other one treated conservatively after blood transfusion.

Table 1 Demographic and clinical data, type of termination of pregnancy and outcome results of 21 patients with Cesarean scar pregnancy

<i>Case</i>	<i>Age (years)</i>	<i>Previous C.S (n)</i>	<i>G A at Dx (wks)</i>	<i>Type of TOP</i>	<i>complications</i>	<i>Total bleeding (ML)</i>	<i>Outcome/observations</i>
1	24	2	6+3	s. i methotrexate	None		
2	35	4	7+1	s. i methotrexate	None		
3	24	3	6+1	G.S aspiration	I.O bleeding	500	
4	32	2	6+2	G.S aspiration	I.O bleeding	300	
5	27	3	6+2	s. i methotrexate	None		
6	39	3	6+5	s. i methotrexate	None		
7	41	3	7+2	s. i methotrexate	None		
8	26	2	6+1	G.S aspiration	I.O bleeding	500	
9	29	1	6+3	s. i methotrexate	None		
10	42	3	7+1	s. i methotrexate	None		
11	36	2	6+1	G.S aspiration	I.O Bleeding	600	
12	32	1	6+2	s. i methotrexate	None		
13	20	1	7+1	s. i methotrexate	None		
14	28	2	6+1	s. i methotrexate	None		
15	36	3	6+2	G.S aspiration	I. O bleeding	300	
16	41	2	6+5	s. i methotrexate	None		
17	29	1	6+1	s. i methotrexate	None		
18	37	2	6+2	s. i methotrexate	None		
19	27	1	6+5	G.S aspiration	I.O Bleeding, pelvic hematoma	1200	Hystrectomy
20	34	2	7+3	s. i methotrexate	None		
21	31	2	6+1	G.S aspiration	I.O Bleeding, pelvic hematoma	1000	Uterine rupture-pelvic hematoma - Conservative treatment after blood transfusion

C.S, Cesarean section.

G.A, gestational age.

Dx; diagnosis

wks, weeks.

TOP, termination of pregnancy;

S.I; systemic injection

I.O intraoperative bleeding

In case No 19, (figure 1) Trans-vaginal US at 8 weeks showing gestational sac implanted at the isthmic region between the cervix and the empty uterine cavity at the level of CS scar and no fetal pole seen (figure 1-A).

Follow up US after one week revealed a small fetal pole inside the sac with no active cardiac pulsations seen as a non vascular ectopic scar pregnancy with non viable fetus (figure 1-B).

After suction of the gestational sac in this case , intra-operative bleeding happened, insertion of folly's catheter in the uterine cavity, balloon inflated with 35 ml of normal saline, bleeding was not controlled, bleeding continue 400 ml/ hour for 3 hours, meanwhile blood transfusion started , 3 unites packed RBCs, at the end hysterectomy was done as a life saving procedure.

In case No 21, after aspiration of gestational sac, bleeding occurred, insertion of folly's catheter in the uterine cavity was done, balloon inflated with 35 ml of normal saline, bleeding was controlled, hemoglobin is dropped from 11 to 7.5 gm in first day post operative, US revealed large pelvic hematoma (figure 2-B) , patient received 3 unites , post transfusion hemoglobin become 10.5 gm, regular follow up by MRI (figure 2-C) and US (figure 2-D) were done, MRI study revealed uterine rupture with defect of anterior uterine wall at the site of C.S scar, patient kept under observation, her hemoglobin remains at the same level during follow up with no drop of its level, and was discharge with regular follow up weekly for one month and monthly for next 4 months with US and complete blood count. Follow up MRI after 6 months (figure 2-E) showing fibrotic scarring of previous uterine rupture.

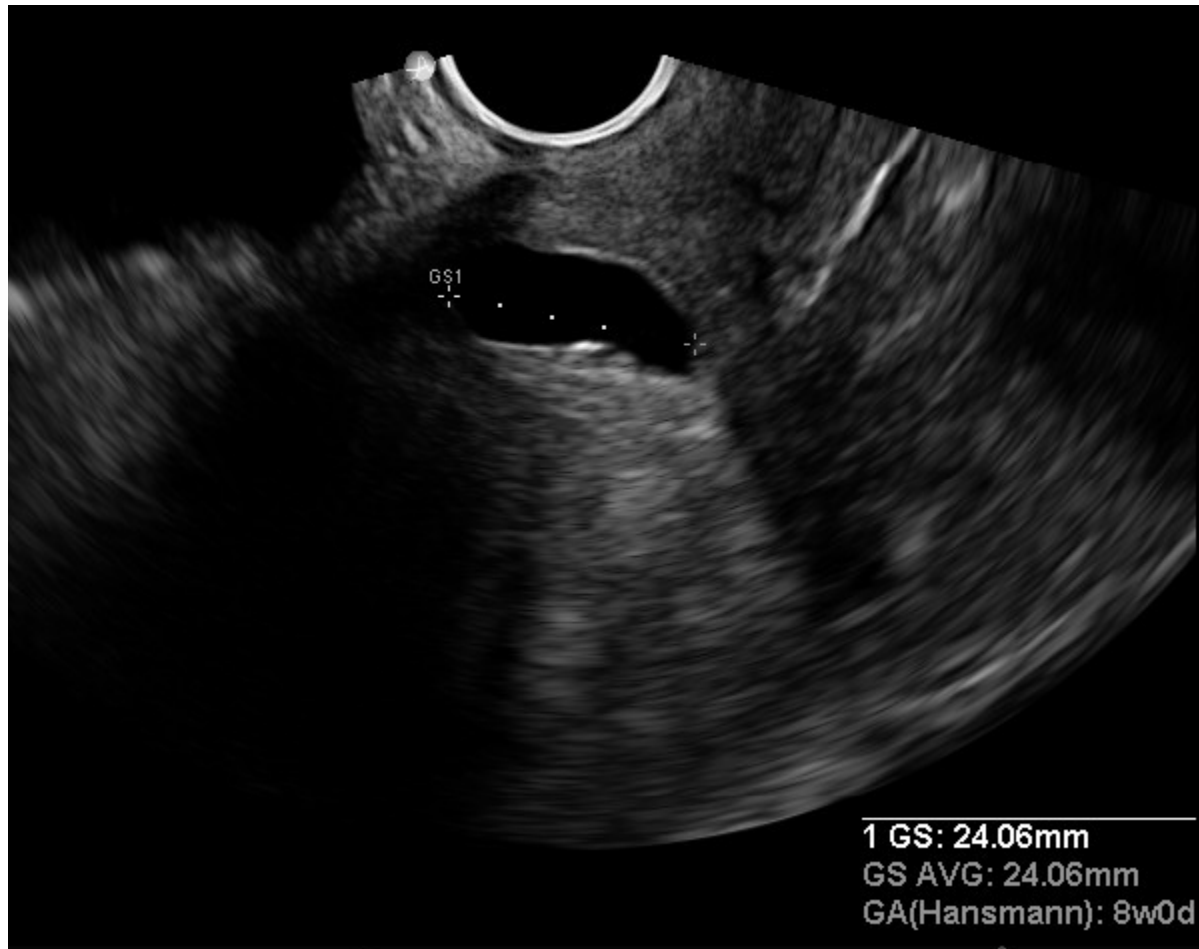


Figure 1- A; A midline sagittal trans-vaginal image demonstrating a gestational sac implanted at the isthmic region between the cervix and the empty uterine cavity at the level of CS scar, it measures 24mm consistent with 8 weeks gestation. Yolk sac was seen. No fetal pole seen at the first exam.



Figure 1 –B; Follow up US after one week revealed intrauterine gestational sac seen at lower uterine segment within CS scar with vascularity seen surrounding it. Fetal pole seen as a non vascular mass measures 14x 12 mm suggesting ectopic scar pregnancy with non viable fetus.

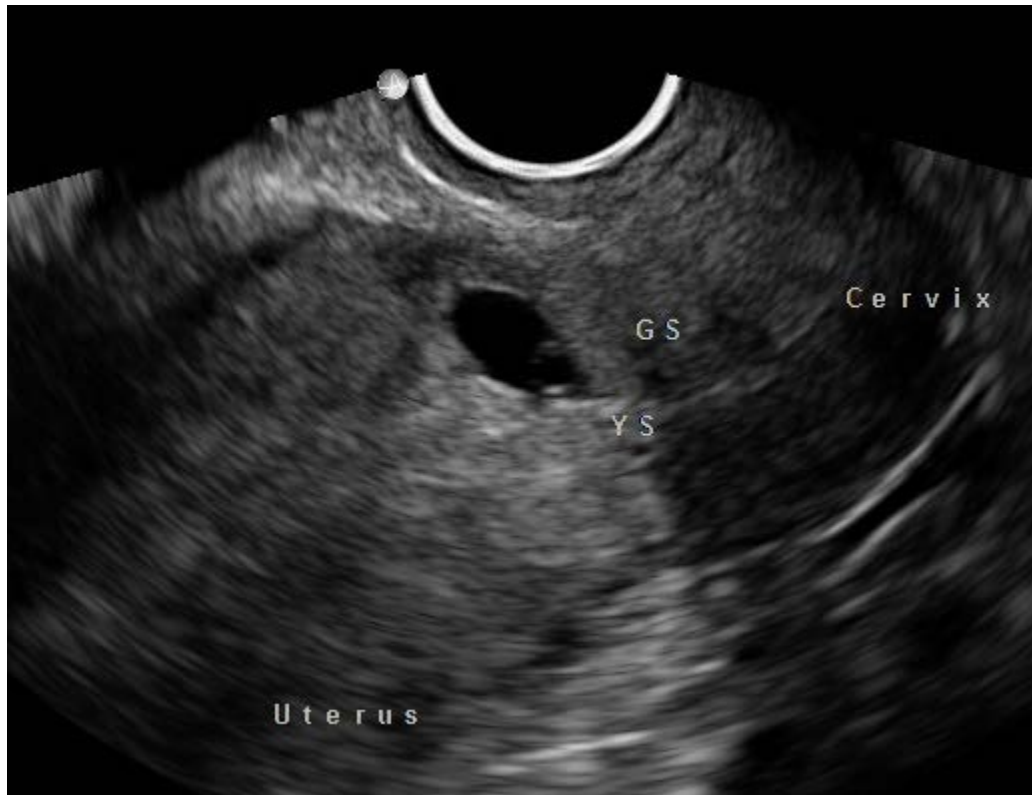


Figure 2-A, a midline sagittal trans-vaginal image demonstrating a gestational sac implanted in the isthmo-cervical region at the level of C.S scar. It measures 12.4 mm consistent with 6weeks and 3 days and contains yolk sac.

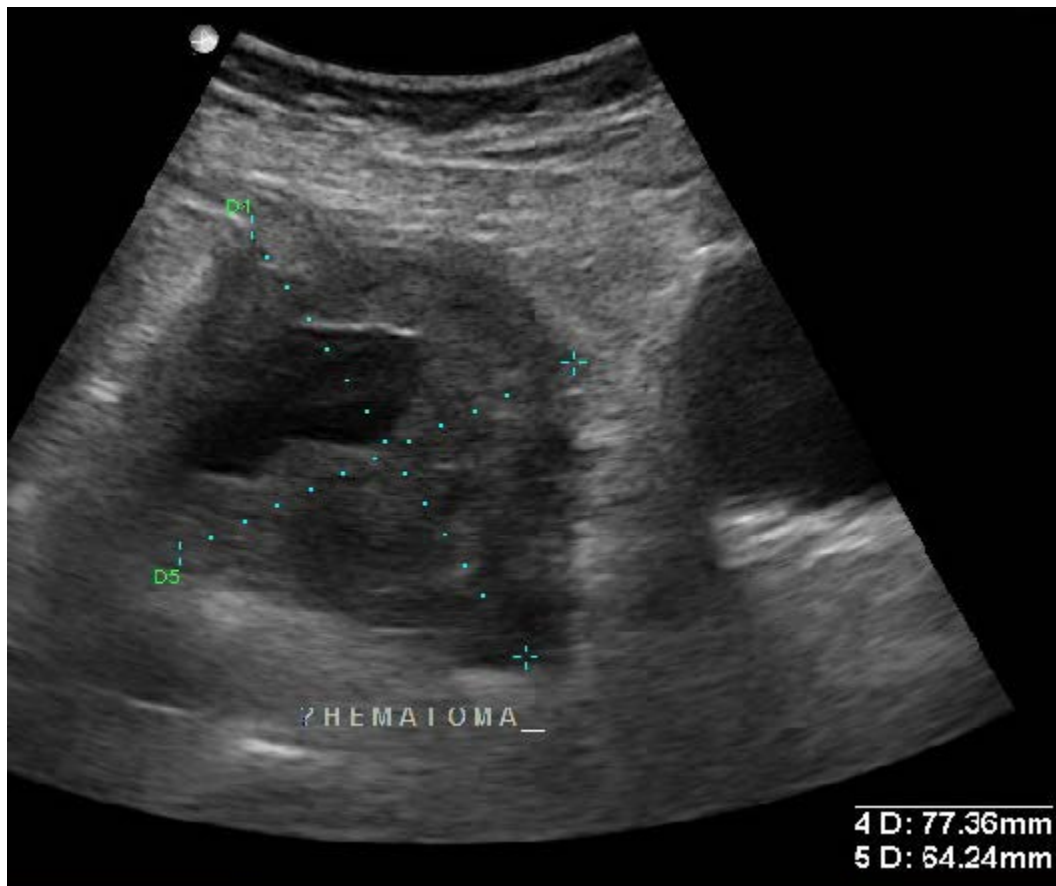


Figure 2-B, after aspiration of gestational sac, trans-vaginal ultrasound revealed a large heterogeneous hematoma is seen anterior to the uterus and extending to left adnexa measures 7.7x 6.4cm.

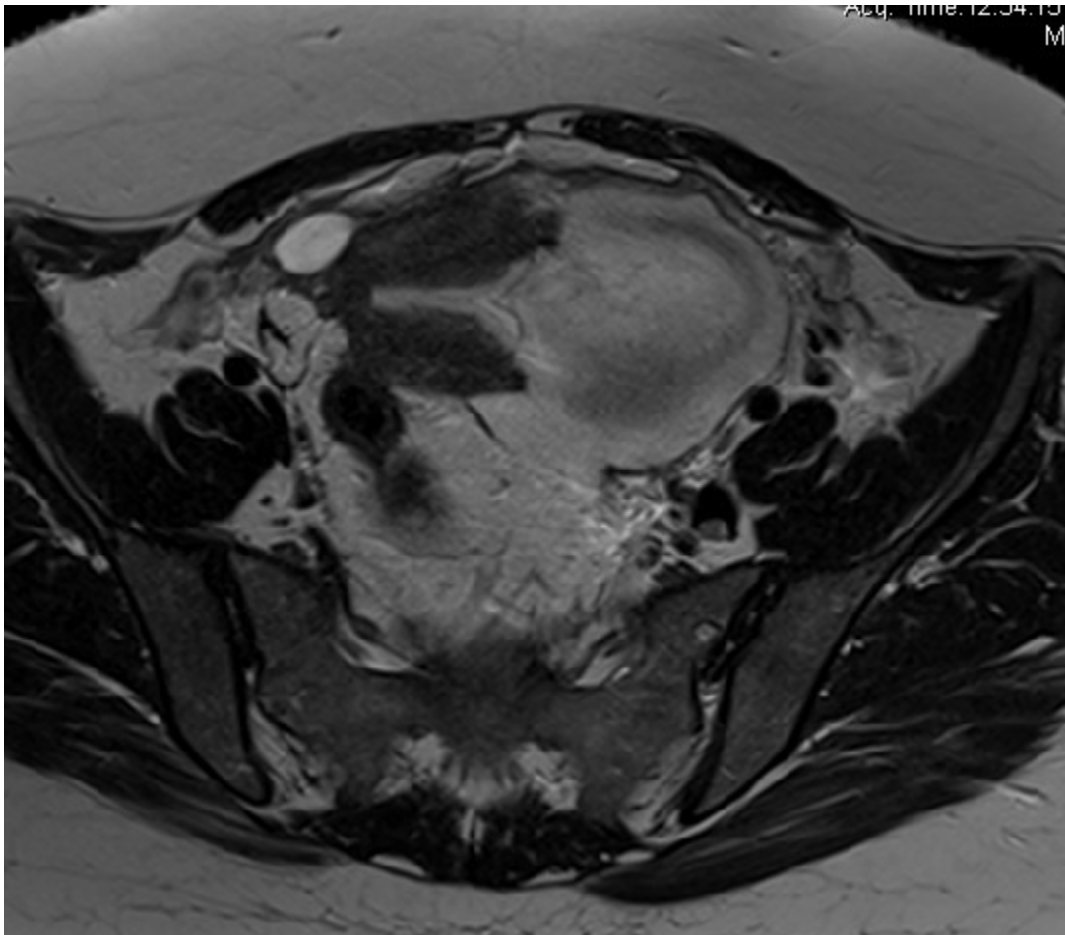


Figure 2-C Axial MRI T2 weighted images of the patient showing high signal content along the lateral wall with defect-like, this extend from the uterine cavity through the defect in the wall to the lateral wall of the uterus about 9x 6 cm (hematoma).

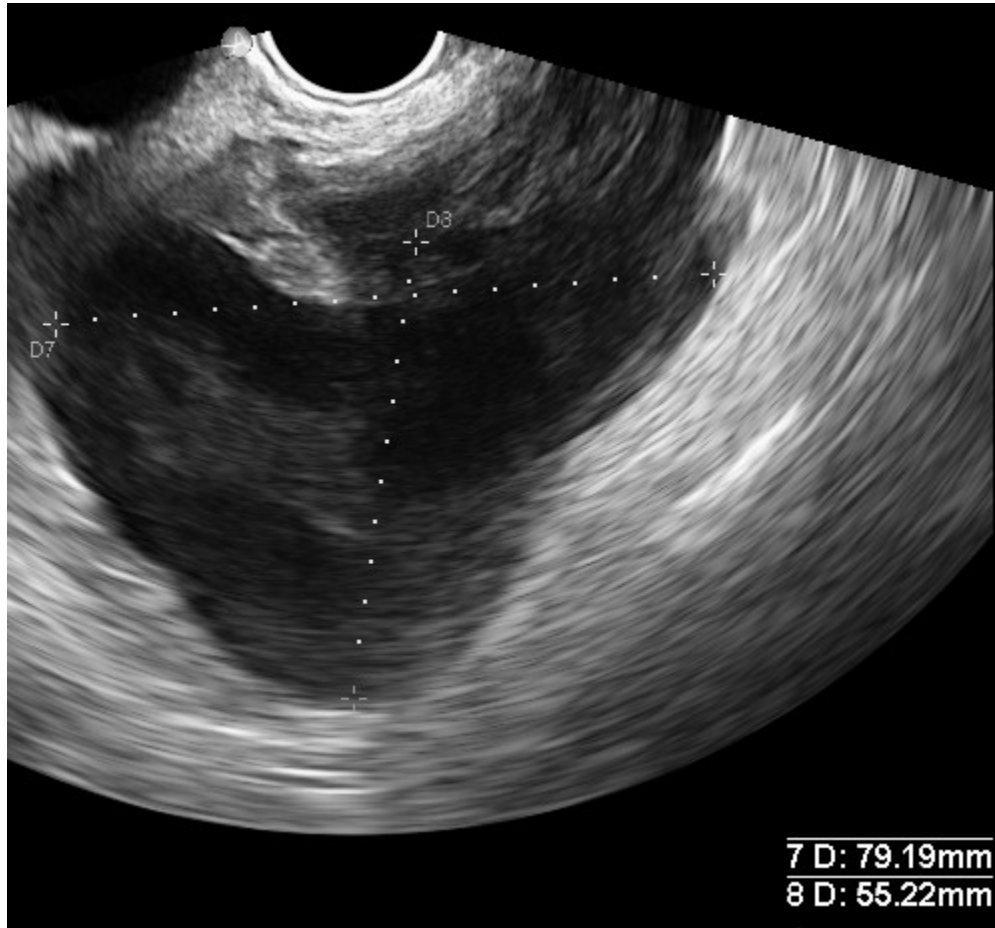


Figure 2-D, this patient treated conservatively with follow up of the [pelvic hematoma, Follow up US Pelvic hematoma is still noted with no significant changes in size.

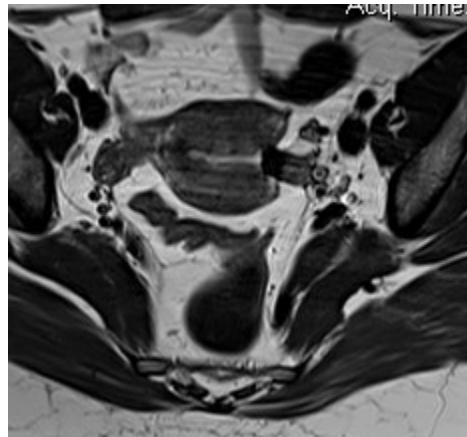


Figure 2- E Follow up Axial MRI T2 weighted images after 6 months, showing distortion of left lateral wall with indentation reaches the lateral aspect of endometrial cavity in keeping with fibrotic scarring of previous uterine rupture.

DISCUSSION

Due to the high rate of patients with previous cesarean section that is referred to our hospital, this in turn led to increase in the rate of scar ectopic pregnancy which is the rarest form of ectopic pregnancy.

The incidence of ectopic pregnancy is high in our hospital because it is a territory center to where many women who have abnormal or ectopic pregnancy were referred for further diagnosis and treatment. Also we believe that our radiology department is excellent to diagnose early abnormal pregnancy using high resolution trans-vaginal ultrasound.

In our study, all patients had at least one previous cesarean section, most of case had two previous cesarean section (43 %) while 24 % of patients had only one prior cesarean section, this

is because in Saudi Arabia most of patient had high parity for social reaching up to 12 parities, but we are not sure about the relation between the risk of scar ectopic pregnancy and number of previous section.

Many literature describes pregnancies implanted low and anteriorly as being 'on the scar', termed 'true scar pregnancy', differentiating them from gestations found entirely surrounded by myometrium, and 'in the scar', or in the niche of scar, with a thin or no myometrium between the gestational sac and the bladder (28-29).

It occurrence related to an exciting scar defect or microscopic dehiscence tract between the cesarean scar and endometrial canal (30).

None of our cases had history of intrauterine contraceptive devices (IUCD), as IUCD is not a preferred method of patients with previous C.S.

Clinically most of patients have no specific symptoms related to pregnancy, 6 patients complaining of vaginal bleeding 2 of them had abdominal pain in association with vaginal bleeding.

Local methotrexate administration either with trans-abdominal or trans-vaginal approach increases the success rate due to the high concentration of methotrexate within lesion and avoiding the side effects of systemic treatment (31). However, in our experience we prefer injection of systemic methotrexate, although there is some disadvantages of medical therapy are slow resolution of the pregnancy (which can take months), with risk of rupture and hemorrhage; hysterectomy may be necessary (32). No complications occur in our cases that treated with systemic methotrexate and no side effects including pneumonia, nausea, stomatitis, may be because we use 2 : 3 doses of methotrexate as a maximum doses.

Intra-operative bleeding occurs in all our 6 cases treated with aspiration of gestational sac, one of them ends with hysterectomy.

We did not use surgical resection in our study which has advantage that it provides an opportunity to both remove the pregnancy and repair the defect, and avoids the risk of hemorrhage from rupture if medical therapy fails (32).

Early diagnosis of the scar ectopic pregnancy in our study and as reported by some authors (33-34) led to less mortality and high success rate of conservative treatment. Because Cesarean scar pregnancy (CSP) is a precursor to and an early form of second- and third-trimester morbidly adherent placenta (MAP), so early diagnosis and treatment prevent mortality of abnormal placentation.

In our experience, serial trans-vaginal color Doppler ultrasound is very useful in monitoring and follow up cesarean scar pregnancy and it is correlates with serum b-hCG level. Patient with high flow velocity have the risk of uterine rupture and internal bleeding. D & C should not be done to those patients to terminate ectopic pregnancy due to the danger of severe bleeding from that area of high flow velocity.

In our study, we follow the ectopic scar mass after the b-hCG become normal, and we found that it may persist for months. The explanation of that is the scanty venous flow at the fibrous scar lead to difficult absorption of the residual tissue or due to proliferation of the collagen fibers in the ischemic uterine part in response to myometrial injury by placental villi invasion (35).

With the advent of trans- vaginal sonography and with the use of saline infusion, post-Caesarean section uterine wall integrity can be detected even in the non-pregnant state (14-15-36). Caesarean section scar defect, defined by the presence of fluid within the incision site (15), or

any filling defect ('niche'), defined as a triangular anechoic structure at the presumed site of the scar (36) this might alert for uterine scar complication in the subsequent pregnancy (14-15).

One of our patient have uterine rupture , the patient followed till formation of the fibrous tissue at the site of rupture, the spontaneous uterine rupture has been reported in patients with prior C.S (37), these patients 17 times more likely to have uterine rupture more than patients with unscarred uterus(38). The risk is higher after implantation of pregnancy in the scar (39).

CONCLUSION

Cesarean scar pregnancy is the rarest type of ectopic pregnancy, and it is life-threatening pregnancy complication. Early imaging recognition, diagnosis of CSEP and effective treatment is critically important to improve outcome, minimize the need for emergency extended surgery, minimize maternal complications, maintain treatment options, and potentially preserve future fertility.

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