MANAGEMENT OF CESAREAN SCAR PREGNANCY

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INTRODUCTION

- Cesarean scar pregnancy (CSP) is an ectopic pregnancy implanted in the myometrium at the site of a previous cesarean section scar.
- Cesarean scar pregnancy was first described in 1978 in a South African Journal by Larsen and Solomon. [1]
- Cesarean scar pregnancy occurs when a gestational sac implants at the site of a previous hysterotomy scar. With an incidence of **1 in 1,800 to 1 in 2,200 pregnancies**, cesarean scar pregnancies represent 6% of all ectopic pregnancies in women with prior cesarean delivery [2].
- CSP has been described in spontaneously conceived pregnancy as well as after in vitro fertilisation (IVF) and embryo transfer.
- IVF associated heterotopic CSP, a rarer event, has also been described, both with twins and triplets.The gestational age at diagnosis ranged from 5 to 12.4 weeks [3].

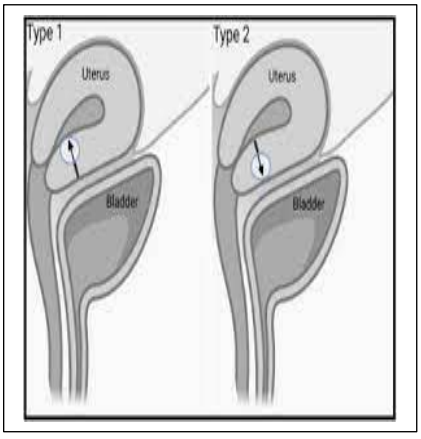
NATUREAL HISTORY

- Very few of these pregnancies reported in the literature progressed beyond first trimester.
- A pregnancy in a caesarean section scar were to continue to the second or third trimesters, there would be a substantial risk of uterine rupture with catastrophic haemorrhage, with a high risk of hysterectomy causing serious maternal morbidity and loss of future fertility.
- If the pregnancy continues within the uterus, the risk of placenta accreta is significantly increased, up to three- to five-fold.
- A pregnancy that protrudes through the scar, if viable, can implant on other abdominal organs and continue to grow as a secondary abdominal pregnancy.
- A Caesarean Scar Pregnancy progressing to 35 weeks of gestation has been described in British Journal in 1995 [4].
- But this case was complicated by massive haemorrhage and disseminated intravascular coagulopathy at CS, requiring a life-saving hysterectomy.

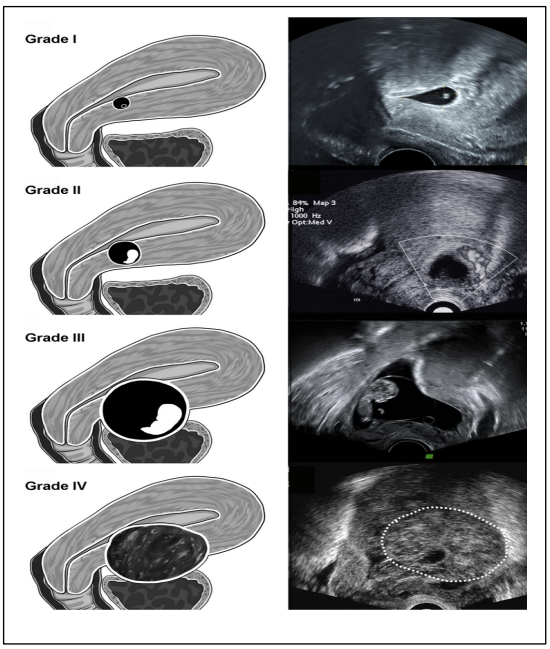
TYPES OF CSP:

[A]. *Based on ultrasound scan* findings and pregnancy progression, CSP is classified into two types:

1. **Type one or endogenic CSP**, is where implantation occurs on the scar and the gestational sac grows towards the cervico-isthmic or uterine cavity
2. **Type two or exogenic CSP**, occurs when the gestational sac is deeply embedded in the scar and the surrounding myometrium and grows towards the bladder.



[B]. *Shin et al grading of CSP* [5]:
The description of this new ultrasound grading system for CSP.
Grade I CSP represented the depth of CSP embedded in less than one-half thickness of the lower anterior corpus.
Grade II CSP implied CSP occupied more than one-half thickness of the lower anterior corpus.
Grade III CSP, the GS bulged out the overlying myometrium and uterine serosa.
Grade IV CSP, the GS became an amorphous tumor with rich vascularity at the cesarean scar.



PATHOPHYSIOLOGY:

- In CSP, the gestation sac is completely surrounded by myometrium and the fibrous tissue of the scar, quite separate from the endometrial cavity.
- The most probable mechanism is that there is invasion of the myometrium through a microtubular tract between the caesarean section scar and the endometrial canal.
- Such a tract can also develop from the trauma of other uterine surgery, e.g. curettage, myomectomy, metroplasty, hysteroscopy and even manual removal of placenta.
- The risk of scar implantation might be proportional to the **size** of the anterior uterine wall defect possibly due to larger surface area induced by the scar.
- Elective CS for **breech presentation** in a previous pregnancy appears to be most frequently associated with future risk of CSP.
- The impact of the **time interval** between the previous caesarean sections and the subsequent CSP implantation is also not clear.

DIAGNOSIS OF CSP

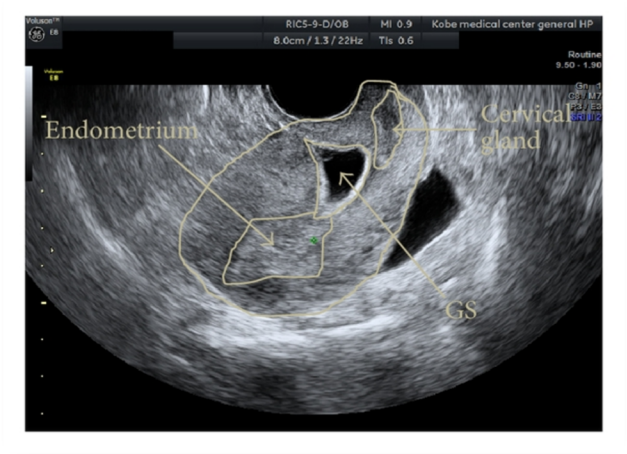
1. **CLINICAL PRESENTATION.**
2. **ULTRASOUND; 2D, DOPPLER, 3D**
3. **MRI.**
4. **LAPAROSCOPY**

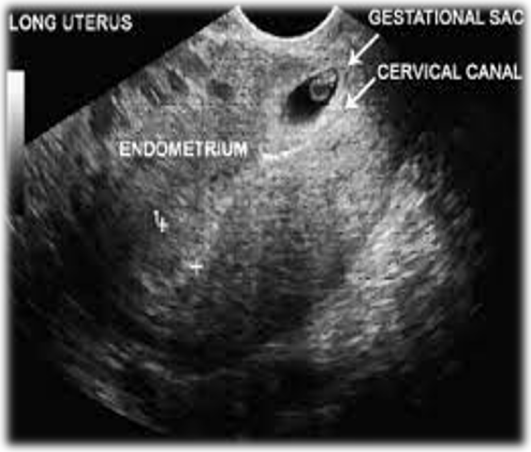
CLINICAL PRESENTATION:

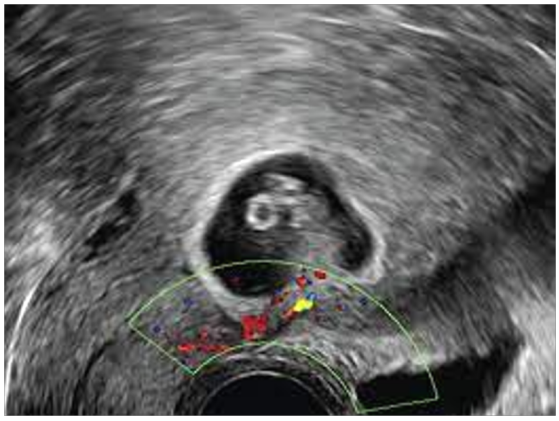
- CSP may present from as early as 5–6 weeks5 to as late as 16 weeks.
- A light, *painless vaginal bleeding* (39%).
- Abdominal *pain* with *bleeding* (16%)
- Only abdominal *pain* (9%)
- Incidental finding in an *asymptomatic* woman (37%).
- Severe acute pain with profuse bleeding implies an *impending rupture*.
- *Collapse* or haemodynamic instability strongly indicates a ruptured CSP

ULTRASOUND:

- Ultrasound is the **first-line diagnostic** tool for CSP.
- The following ultrasound criteria have been put forward for the diagnosis of a CSP.
  1. An empty uterine cavity, without contact with the sac
  2. A clearly visible empty cervical canal, without contact with the sac .
  3. Presence of the gestation sac with or without a fetal pole with or without fetal cardiac activity (depending on the gestation age) in the anterior part of the uterine isthmus.
  4. Absence of or a defect in the myometrial tissue between the bladder and the sac.

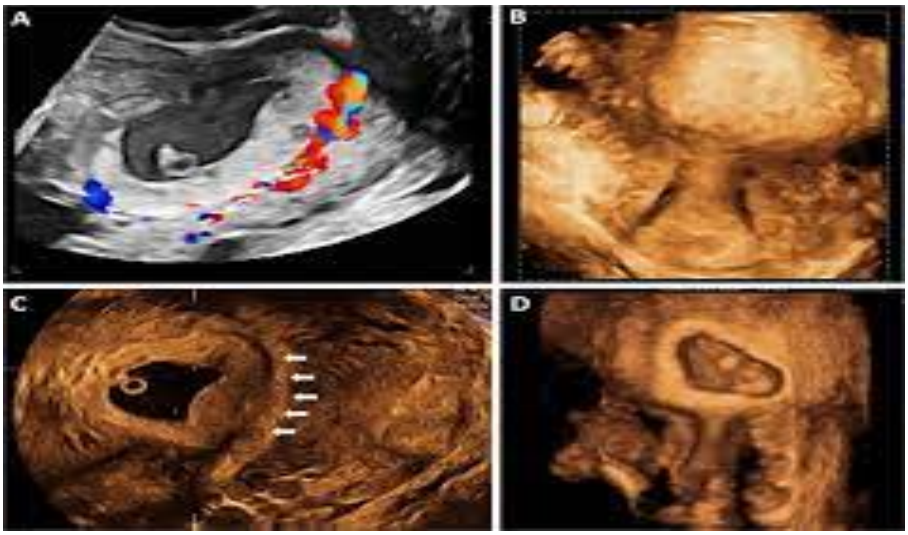






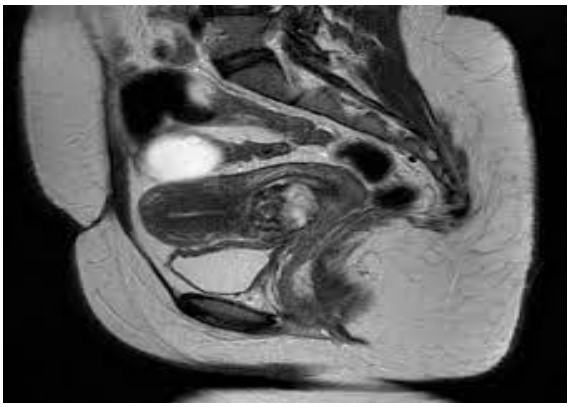
DOPPLER & 3-D COLOR DOPPLER:

- Shows distinct circular peritrophoblastic perfusion surrounding the gestation sac and can help show the relation of placenta to the scar and bladder.
- New 3-D color Doppler imaging technique (termed **3- D-virtual organ computer-aided analysis [VOCAL]**) can be used to monitor the quantification of changes of uterine neovascularisation characteristics before and after successful treatment of CSP. [6]



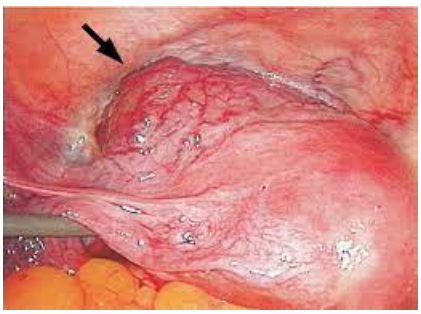
MRI:

- MRI can measure the volume of the lesion and thus help assess the indication and success of local methotrexate (MTX), with an added advantage that it can also improve intraoperative orientation.



DIAGNOSTIC LAPAROSCOPY

- The uterus is usually seen normal sized or bulky with the CSP arising as a hillock with a **'salmon red' ecchymotic appearance**, bulging the uterine serosa from the previous caesarean section scar behind the bladder.



DIFFERENTIAL DIAGNOSIS:

1. *Spontaneous Abortion* **:** the gestation sac should be seen in the cervical canal on TVS, and on colour flow Doppler, the sac should appear avascular, indicating that the sac has been detached from its implantation site, in contrast to the well-perfused CSP located in its unique site.
2. *Cervicoisthmic Pregnancy* :unlike a CSP, there would be a layer of healthy myometrium visible between the bladder and the gestation sac on USG and bleeding as the presenting symptom is much heavier.
3. *Trophoblastic Tumor*
4. *Very low implanted intrauterine pregnancy*

MANAGEMENT OF CSP

- Treatment of CSP should be evidence based and focus on prevention of severe complications and conservation of fertility.
- Timor-Tritsch and Monteagudo (2012) identified 31 different primary treatment options in 751 women with CSP [7]
- American Society of Reproductive Medicine published a largest systematic review treatment studies for CSP in January 2016. It included 14 treatment modalities [8].
- We can summarize the management options as follows:
  - A. EXPECTANT MANAGEMENT
  - B. MEDICAL MANAGEMENT:
    1. SYSTEMIC METHOTREXATE
    2. LOCAL INJECTION OF EMBRYOCIDES
    3. COMBINED MEDICAL TREATMENT
    4. MEDICAL TREATMENT COMBINED WITH SURGICAL ASPIRATION OF THE SAC
  - C. SURGICAL TREATMENT:
    1. UTERINE CURETTAGE
    2. HYSTEROSCOPIC EVACUATION
    3. LAPAROSCOPIC EXCISION
    4. OPEN SURGICAL REMOVAL
    5. HYSTERECTOMY
  - D. OTHER TREATMENT MODALITIES:
    1. HIGHT INTENSITY FOCUSED ULTRASOUND (HIFU) ABLATION
    2. HIFU +HYSTEROSCOPIC SUCTION CURETTAGE

EXPEXTANT MANAGEMENT:

- If woman does not wish to have a TOP and wants to continue the pregnancy, and there is sonographic evidence of the sac growing *towards the uterine cavity*, an EXPECTANT Management can be considered *at life threatening risks*.
- The minimum thickness of the myometrium anterior to the CSP sac to warrant safety of a continuing pregnancy is unknown.
- An elective delivery by caesarean section around 28–30 weeks with antenatal corticosteroid administered 24–48 hours before delivery.
- The efficacy is low , and the complication rate is high .

MEDICAL MANAGEMENT: SYSTEMIC MTX:

- **Dose:** single dose of 50 mg/m2 IM
- **CRITERIA**: **(1).** Hemodynamically stable. **(2).** Patients without pain , **(3).** Gestation age < 8 weeks, **(4).**Myometrium thickness <2 mm between and the bladder& sac, **(5).**Serum hCG < 5000IU/L, **(6).** Gestation sac <2.5 cm , (7). No foetal heart motion

-Complication rate is 13%

MEDICAL MANAGEMENT: LOCAL INJECTION OF EMBRYOCIDES:

- Local injection of MTX, potassium chloride , hyperosmolar glucose and crystalline trichosanthin have been used for termination of CSP, but Methotrexate is the preferred agent.
- Under ultrasound guidance, MTX can be injected locally to the gestation sac via transabdominal or via transvaginal route.
- The usual technique for injection of MTX uses 20- to 22-gauge needle.
- 16-gauge double-lumen oocyte-retrieval IVF needles ensure better aspiration of the trophoblastic tissue via one lumen and injection of MTX through the other.

COMBINED MEDICAL TREATMENT:

Combined medical treatment in varying regimens has been described by many authors;

1. Local injection of 8 mEq potassium chloride (2 mEq/ml) followed by 60 mg of MTX injected into the gestation sac.
2. Direct injection of 3 ml of 50% glucose plus oral MTX (2.5 mg three times a day for 5 days)
3. Cervical injection of crystalline trichosanthin (1.2 mg) followed by oral mifepristone (50 mg orally every 12 hours for 3 days) or intramuscular MTX and

MEDICAL TREATMENT COMBINED WITH SURGICAL ASPIRATION OF SAC:

Medical treatment may be combined with surgical aspiration of the sac in some cases. Various sequences of combination have been described:

1. Local potassium chloride / TVS-guided sac aspiration / local MTX injection / intramuscular MTX injection
2. Systemic MTX / TVS-guided sac aspiration
3. Sac aspiration (transvaginal or transabdominal) / local or sytemic MTX injection
4. Systemic MTX / sac aspiration by vaginal route / local MTX.

Ultrasound guided D &C with methotrexate is the most common treatment modality.

SURGICAL MANAGEMENT: UTERINE CURETTAGE

- The gestation sac of a CSP is not actually within the uterine cavity. Therefore, not only the trophoblastic tissue is unreachable by the curette but also such attempts can potentially rupture the uterine scar.
- *Suction curettage can be done under ultrasound guidance when gestation is < 7 weeks and the myometrial thickness anterior to the CSP is >3.5 mm.* [9]
- Adjuvant haemostatic measures like local injection of vasopressin, or uterine artery embolization might be required
- Complication rate 21%

SURGICAL MANAGEMENT: HYSTEROSCOPIC EVACUATION:

- Successful treatment of CSP by operative hysteroscopy and suction curettage in 2005 by Chang et al [10]
- The gestational sac is dissected free of the uterine wall through a natural entrance, and hemostasis can be achieved with electro-coagulation using a wire-loop or roller-ball.
- A balloon catheter can be placed postoperatively for compression hemostasis and wound surface drainage.
- Complication rate =3.1%

SURGICAL MANAGEMENT: LAPAROSCOPIC EXCISION:

- Lee et al. were the first to perform a successful laparoscopic resection of a CSP in 1999.[11]
- The CSP mass is incised and the pregnancy tissue removed in an endobag.
- Bleeding can be minimised by local injection of vasopressin (1 unit/ml, 5–10 ml)
- Hemostasis achieved by bipolar diathermy and the uterine defect closed with endoscopic suturing.
- The success rate was very high (97.1%), and there were no reported severe complications.

OPEN SURGICAL MANAGEMENT:

- Laparotomy followed by wedge resection of the lesion should be considered in women who do not respond to conservative medical and facilities for endoscopy are not available.
- Laparotomy is mandatory when uterine rupture is confirmed or strongly suspected.
- Some consider this *as the best treatment option*, as the excision of the old scar removes the microtubular tracts and thus reduces the risk of recurrence.
- However, there is higher chance of placenta accrete latter on.

SURGICAL MANAGEMENT: HYSTERECTOMY:

- Hysterectomy is not advised as a primary procedure of treatment except in cases of *intractable hemorrhage* due to rupture.
- It is generally used as a last resort to previously failed procedures or any life threatening complications of the procedures.

Repeated High-intensity Focused Ultrasound Ablation; (HIFU)

- HIFU beams are precisely focused on a small region of diseased tissue to locally deposit high levels of energy. The temperature of tissue at the focus will rise to between 65° and 85 °C, destroying the diseased tissue by coagulative necrosis.
- This treatment modality was first described in one high-quality case series of 16 women with treatment failure or complication. [12]

Repeated HIFU with Hysteroscopic Suction Curettage:

Zhu et al (2015) have described a high quality case series of 53 women, with a success rate of 100% and no complications. [13]

WHAT ABOUT THE FUTURE PREGNANCY:

- Women with a cesarean scar pregnancy are at risk for its recurrence in the future, although normal pregnancy after a cesarean scar pregnancy is also possible. Safe outcomes depend on timely diagnosis and multidisciplinary care by skilled clinicians.[2].
- Seow et al have shown a 50% CSP cases were followed by uneventful pregnancy, with a mean interval of 13.3 months (range 3–34 months) between the previous CSP and subsequent pregnancy. [14]
- The risk of recurrence has been reported to be 3.2% -5% in women with one previous CSP treated by dilatation and curettage with or without uterine artery embolization.

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