



## Letters to the Editor – Brief Communications

### Considerations and variations in cesarean delivery techniques: A surgeon's view



Dear editor,

Caesarean section is a common operation in obstetric practice. Techniques vary depending on the clinical situation and the preferences of the operator. I am here reporting 3 important considerations in the surgical technique. First i will discuss peritoneal closure then the role of uterine Exteriorization and finally uterine incision and closure techniques.

Usually Peritoneal and subcutaneous suturing are not recommended. We propose the closure of both layers of the peritoneum and the subcutaneous tissue in cesarean section. This can be done with absorbable suture not a tight closure but just approximation of edges. There are some benefits regarding this method. This is an anatomical repair that is associated with low incidence of adhesions, better hemostasis, low risk of bleeding on tissue dissection during next surgery and a better identified tissue planes a bit like dissection in patient for the first cesarean section. The disadvantages are more postoperative pain encountered, more suture material used with related cost and tissue reaction. It is better to avoid tight closure as it can lead to dense fibrosis with difficulty in identifying tissues planes later in next surgery and difficulty in tissue dissection with scissor or scalpel as dense fibrosis is encountered especially at subcutaneous tissues where a traumatic fat necrosis can occur. It is better to suture the visceral peritoneum over the sutures of the uterine incision and then the parietal peritoneum is sutured so that no oozing occurs with the resulting fibrosis between bladder and uterus, and between uterus and abdominal wall. Also peritoneal closure is associated with low incidence of bulging of the abdominal contents during the first 24 h between the unhealed edges of the peritoneum and gapped muscles with the resulting adhesions between the abdominal contents and the rectus sheath or muscle with accidental injury during next surgery dissection. This 24 hours is the period needed for peritoneal self reepithelization in no suturing technique recommended by the guidelines. This bulging can occur especially with poor approximation of peritoneal edges with poor analgesic use in the postoperative period especially in countries with Low resources. Peritoneal closure aims to make a barrier between different tissues like normal anatomy, limiting adhesions between raw surfaces especially if unpredicted healing is anticipated as in cases of previous surgeries. Suture Approximation of muscles is also propped, so that no peritoneum can bulge under the sheath with iatrogenic abdomino-pelvic organ injuries on sheath incision with recurrent sections. The rectus muscle is better to be just approximated with no tension using oblique continuous suturing or interrupted simple ones to avoid tearing through the muscles (Fig. 3). The oblique suturing is much better as it grasps good bulk of length of the muscle and is some

what parallel to the muscle direction that limits muscle tearing. Regarding subcutaneous closure, it is better to be done by a rapid absorbable suture with just approximation taking care of angles with hidden dead space below by deeper subcutaneous dissection, avoiding seroma formation with better skin approximation and good hemostasis.

The white line is the epidermis and dermis, so the usual skin suture is intradermal (subcuticular). Regarding skin closure, in order to gain the best cosmetic results, it is better to Suture the skin using subcuticular or intradermal suture by just approximation of edges and not using a tightening suture with no loose gaps between skin bites or everted edges or wrinkled suture line after suturing, so that no hypertrophic or keloid scar can occur as the associated fibrous tissue is thick. It is better to use the 3 sided square technique in subcuticular closure in non fibrous skin as primisection or excising the previous skin scar and proceed as before in cases of recurrent section or we can use the zigzag technique in fibrous skin as in cases where the skin is incised at the site of previous scar, which is better in hindering the everted edges and winking of skin scar. Also, small bites in suturing is important so that no wrinkled skin on pulling the thread is encountered (Fig. 4). We can Take multiple skin bites then pull the thread so that no much force is needed at the end of suturing with a resulting wrinkling. It is better to use the subcuticular or intradermal suturing rather than the just the subdermal suturing as it is associated with better edge approximation, better hemostasis and less fibrosis and less likely to need adhesive strips. It is better to excise the previous skin scar especially if it is wide, dense, irregular or abnormal shape and usually the recurrence is low, this may be related to adaptation of tissues to manipulation and foreign bodies as sutures, seroma, hematoma or better hemostasis in a fibrous tissue.

If we follow these modifications, during the next section, we usually encounter less vascular soft fibrous tissue with well identified tissue planes with thin scar line. There is some toughness on tissue incision according to degree of suture tightening and patient healing response. Thin peritoneum layers that are more fibrous but easily incised, well identified with less adhesions in the abdomen related to the uterus or the abdominal wall or between the uterus and abdominal wall is commonly encountered. The skin scar is a thin regular faint white line even after excising a previous hypertrophic scar. What really matters in the occurrence of fibrosis is the degree of tightness in suturing. fibrosis can occur even with or with out these modifications especially with inherent abrommrality in tissue healing, associated adhesion forming disease as advanced endometriosis and adenomyosis, and complicated previous cesarean sections, abdominal surgeries, PID or abdominal infections [1,2].

Exteriorization of the uterus in cesarean section after fetal delivery is the delivery of the uterus from the abdominal cavity to outside. It has some benefits as better assessment of the Adnexa, posterior wall of uterus for adhesions, endometriosis, fibroids and hematoma in broad ligament dissecting retroperitoneal if needed.

It allows better ligation of the uterine vessels when injured or when needed especially with adhesions related and it is done under vision with controlled depth and low intestinal transfixing suturing. It also allows assessment of uterine fixation by adhesions or large size by fibroids, but it is associated with a wider skin incision especially if multiple fibroids are encountered. It is also associated with lower blood loss by kinking the vessels during Exteriorization but more loss on interiorization again, so it is better to assess the suture line for oozing and to assess vaginal bleeding again after reduction of the uterus or interiorization of the uterus.

Regarding interiorization (non exteriorization) of the uterus which means maintaining the uterus intraperitoneal after fetal delivery. It is associated with a smaller skin incision and more blood loss initially during suturing and less blood loss after repair of the uterus. The incision line is exteriorized and secured with multiple clamps to aid suturing, surgeon works in a small field and experience is needed with adequate bladder flap dissection to avoid suturing urinary bladder wall with the uterus or even iatrogenic injury in patients with previous sections.

Exteriorization is recommended in suspected abdominal adhesions for better repair and evaluating injuries after insitu incision and delivery especially in emergency section, extended uterine incision to the uterine angles with uterine vessels injury and incompletely delivered placenta for better removal of remnants of conception. Interiorization (insitu uterine repair) is recommended according to doctor preference, suspecting adhesions that limit Exteriorization with usual site and incision of the uterine wall, no extension and limited experience in dissecting adhesion and poor availability of Green-Armytage Hemostatic Forceps.

If suspecting uterine abdominal wall adhesions on peritoneal entry or rectal sheath incision, we can choose a virgin area for uterine incision after correction of the uterine rotation and dissect adhesions from lower flap to expose the LUS which is better or if junior doctor is doing the section, incision is done at a free area in emergency and no consultant is available. Then, we can proceed with dissection of adhesions and Exteriorization for assessing injuries, extent of incision, ligate uterine vessels and repair or proceed as internal (insitu) repair after fetal delivery if all the incision is accessible especially the edges to avoid broad ligament hematoma.

Mostly these abdominal adhesions are in the form of peritoneal adhesions between the visceral and the parietal peritoneum, omental adhesions or uterine wall adhesions to the muscle layer of the abdominal wall or parietal peritoneum or the rectus sheath. Commonly, the thick adhesions with the uterine wall are located lateral and lower related to the lower uterine flap and the thinner ones are related to the upper flap which may be related to oozing unsutured surface at uterovesical pouch and dependant area for draining the abdomen and pelvis. So, Usually we dissect the upper adhesions to free them from the abdominal wall for exteriorization of the uterus then dissect the lower flap ones in an easier way under direct vision. These upper adhesions can be dissected over a posterior related index finger approached behind the adhesions from a virgin side area to assess extent, to guide dissection and to put adhesions on stretch then piece meal dissection with scissors at the thin, transparent areas that are free of intestinal walls.

These adhesions especially uterine abdominal wall ones can be suspected from the skin scar, where a depressed inwards retracted scar is common to be associated with internal adhesions as it is in part, a whole body abnormal healing. Regarding peritoneal closure as it has a great role in these adhesions, it is better to be done from upper to lower direction as a continuous suture with no suture traction but just approximation or interrupted sutures and no purse string suture or lower to upper continuous suture as they can elevate the urinary bladder up, changing its normal position, where it can be injured later on incising the peritoneum and

increasing its relation to uterine incision. If the peritoneum is deficient below the rectus sheath from dissection in patients with previous sections with bare recti muscles, it is Better to approximate the muscles by sutures so that no adhesions can occur between intra-abdominal structures and the rectus sheath, so they cannot be injured later in a second surgery on incising the rectus sheath as mentioned before. After dissecting adhesions, it is better to cover the bare area by peritoneum to avoid re-adhesions over bare rough areas or if not possible, approximate the muscles, after dissection of abdominal adhesions, bladder flap should be left at a lower position so that it does not readhere high up and the upper dissected adhesions should be hemostatic and better covered by omentum. recurrence of uterine-abdominal wall adhesions after dissection is variable according to thickness, surgical technique but it is better to be dissected to restore the normal anatomy and avoid iatrogenic injuries next time by persistence especially with inexperienced doctors as recurrence is not 100 %.

Multiple discolored thin or thick vascular adhesions encountered on the back of the uterus are common on the left side and are related to endometriosis. They can bleed vigorously if manipulated, so it is better to be avoided and to compress them if bleeding occurs, reserving suturing to last resort as myometrial suturing tear easily with heavy bleeding. The best suture for that is a deep simple transverse suture around the whole adhesions and can be repeated as indicated below or above the previous stitch with gentle slow tying as a compression suture not a tearing one. This is important to be aware of and it is important to be cautious on Exteriorization of the uterus as they can tear easily by traction and finger manipulation used for Exteriorization the uterus. Also an important point to be aware of, is the difficulty in reduction of the uterus encountered in some cases that is related to congested uterus by kinked vessels and fibroid uterus, it should be reduced gently with a towel and good abdominal elevation or even widening the incision [3].

Another important consideration is site of uterine incision. There are some situations in which a doctor may not be aware of the proper site of uterine incision intraoperative so, we are going to deal with that here and here there are some tips regarding uterine closure that can be also of clinical benefit. Usually the incision is at the junction between loose and adherent peritoneum (between upper and lower segment) especially in patients with primary cesarean section. But will it be different in patients presenting with active Advanced labour, second stage section, LUS fibroid, dehiscence scar with amniotic membrane covered by the peritoneum and fetal parts are easily seen, bicornuate uterus, contraction ring between the fetal head and body that is common with acute rupture of membranes with loss of most of the fluid in lower segment, empty LUS, extensive adhesions related to site of incision as in previous section, LUS varicosity that are usually below the peritoneum and fetal anomalies such as hydrocephalus or large size fetal non compressible circumferences or masses that exceed 12 cm (the maximal diameter of the LUS that can be incised without extensions and it is related to the maximum usual transverse diameters of the pelvis). Contraction ring is due to a functional disturbance of the uterine muscle, there is no marked thinning of the lower uterine segment, the thickness of the uterine wall above and below the ring is equal in opposite to the band's ring which is associated with excessive thinning of the lower uterine segment. Also, contraction ring can occur in early or late labour but bands's ring only in late labour (Figs. 1 and 2)

In cesarean section, we usually incise at the junction between the adherent and no adherent peritoneum and at the site of the thinned lower segment that is usually behind the symphysis pubis, if not identified as in previous section, we incise at the scar of previous section or below it if it is already a high one. In cases of

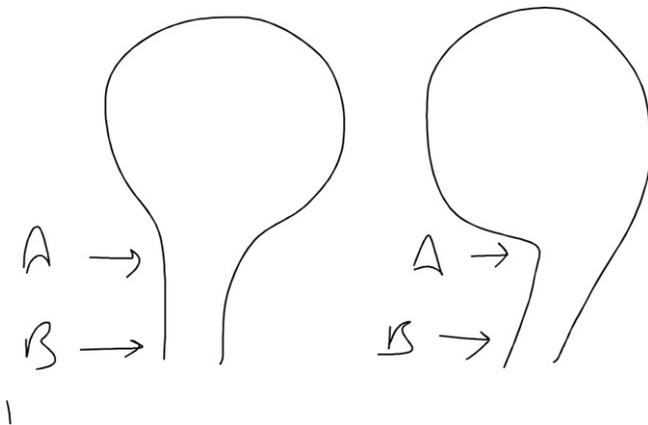


Fig. 1. transverse continuous second inverting layer of uterine closure.

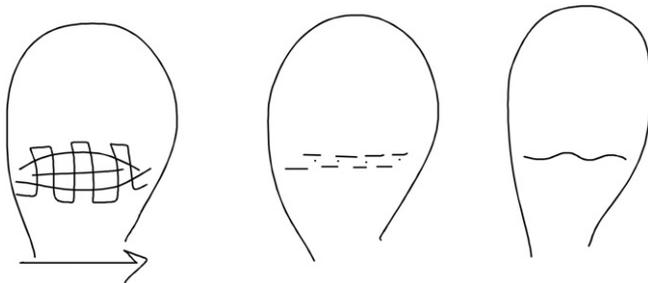


Fig. 2. contraction ring as seen in cesarean section in a side view (left) and anterior view (right) with point b the recommended site for contraction and not a point.

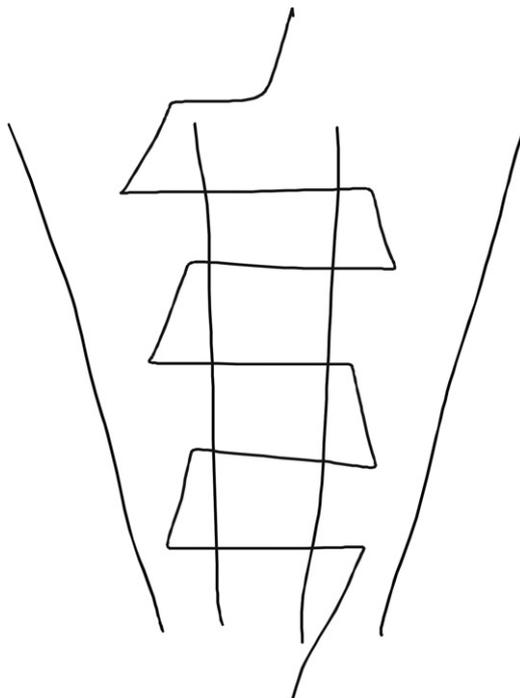


Fig. 3. suture approximation of recto muscles.

Active advanced labour or early labour with full cervical effacement, it is better to incise high up near upper abdominal flap to avoid vaginal incision instead of the lower segment one. In case of varicosity in the LUS, incise the peritoneum away from them and extend the incision with a finger to displace them down with gentle peritoneal retraction without tearing. If they are deep

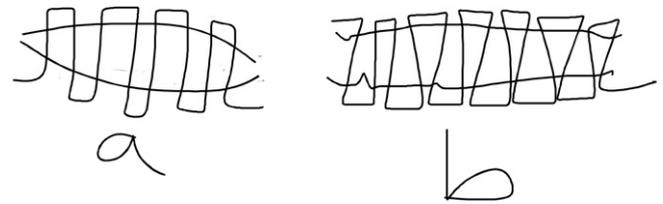


Fig. 4. skin suturing in virgin skin and fibrosed one.

in the uterine wall or no mobile or extensive non retractable with no identifiable virgin area so, it is better to incise high up away from them but this is not common except in case of placenta accreta. In case of fibroid encountered during cesarean section, it is better to perform ultrasound before delivery especially in cases with history suggestive of fibroid to assess location of fibroid and plan uterine incision. If it is encountered during section, it is better to make the incision away from the fibroid by 2 cm if it is at the site of the intended incision or it can be done at the upper border of fibroid then enucleate it later after fetal delivery to avoid postpartum infection or we can proceed as an upper segment incision whether a transverse or longitudinal one but better a transverse one in case of multiple lower ones. In case of extensive thick adhesion in LUS, sharp dissection is better to identify the LUS better with 300 cc saline infused in the urinary bladder for identifying edges to avoid iatrogenic injuries. if this is not possible, a higher incision can be used. In case of dehiscence uterine scar encountered intraoperative, it is better to incise the peritoneum and amnion then deliver the fetus followed by dissection of the lower uterine flap from the peritoneum to suture with the upper dissected one, better after edge trimming for good healing. In case of bicornuate uterus, the usual site incision is used but avoid extension of the incision as the uterus may be totally avulsed by extending backwards. In cases of contraction ring that can be encountered in previous or primisectio patients early or late in labour, it is better to incise at the usual site and not at a higher depressed site (at the ring) as it is usual to be between fetal head and body that is high up which is a false indicator of site. In case of fetal anomalies as fetal Hydrocephalus, it is better to incise high up in Upper segment at a site wider at the level of large palpable fetal head felt, usually as a u shaped one to avoid extension of incision in LUS to uterine vessels and posterior uterine wall.

A last important consideration is the uterine closure. Regarding incision closure, it is better to be use double closure than a single one to avoid later uterine scar defect with postmenstrual bleeding and pregnancy complications later as rupture uterus, placenta accreta or scar ectopic pregnancy. It can be done as a first layer including inner myometrium and second inverting layer through outer myometrium as a continuous suture that is better than the interrupted one for better approximation of edges, lower dehiscence and better hemostasis. The second layer is usually done in a vertical manner perpendicular to the incision but it can be done as show below (Fig. 2) in horizontal parallel manner to the incision with better approximation and hemostasis, lower adhesions and dehiscence. Another important technique in the continuous uterine closure is to avoid excess traction or pulling of the suture that will lead to narrowing of the LUS bringing the 2 round ligaments and uterine vessels to the midline, this can lead to unintended extension of the uterine incision to both vessels in next cesarean section because of the narrow fibrotic lower segment. The aim of suturing is approximation and hemostasis than can be achieved by firm but not tight suturing [4,5].

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## Conflict of interest

The author has nothing to declare.

## Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## Informed consent

Informed consent was obtained from the patient for reporting ultrasound photos.

## Authors' contributions

Elagwany is the main contributor.

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## Laparoscopic lateral hysteropexy with mesh using a special device via retroperitoneal tunneling



Dear Editor,

Because of the changes in sexuality and fertility concerns over the last decade, there is a growing demand for uterine-sparing surgery to treat uterine prolapse [1]. Both laparoscopic sacral hysteropexy and lateral hysteropexy were identified as effective treatment options for uterine prolapse. However, these procedures required long operation time and expert laparoscopic skills [2,3]. Therefore, there is a need for a short-time, minimally invasive procedure. For this purpose, a new procedure has been designed and presented.

A 34-year-old patient, with three previous vaginal births, was admitted to the gynecology clinic of a tertiary research and education hospital in Ankara, with a bulging vaginal mass. In the preoperative examination, using the Pelvic Organ Prolapse Quantification System, stage 3 uterine descent, stage 3 cystocele and low rectocele were identified (Aa: +1, Ba: +2, Ap: 0, Bp: 0, gh: 5, pb: 1, C: +4, D: +1, tvl: 8).

The procedure was performed via laparoscopy using one umbilical and three lateral ports. At the beginning of the operation, two-Y-shaped polypropylene, monofilament, macroporous meshes (Paha®, CE 1014, © 2011, Altaylar Medical, LTD, Sti, Ankara, Turkey) with two short central (2 x 4 cm) and one long arm (2 x 20 cm) were prepared. The operation was designed in three steps.

*In the first step;* a manipulator was applied into the uterus, the cup surrounded the cervix, and the uterus was elevated. Later, each mesh held by a special device, having a suitable concavity to the abdominal side wall towards the uterine cervix, was introduced from the lateral incisions bilaterally via retroperitoneal tunneling (Fig. 1).

*In the second step;* to skeletonize the cervix, vesicovaginal and rectovaginal spaces were dissected in the fascial plane to mobilize the bladder and the rectum. Anterior arms of each mesh were stitched with non-absorbable, synthetic, braided polyester surgical sutures (Multicron®, Orhan Boz AS, Ankara, Turkey) to the anterior wall of the cervix. Posterior arms were introduced to the posterior cervical wall via the tunnels formed in the broad ligament and stitched with 2 knots by the same sutures.

*In the third step;* the long arms of the meshes were fixed to the transverse fascia with two sutures laparoscopically (Supplementary 1).

The operation was performed using conventional trocar sites and lasted in 80 min. After the completion of this procedure, colporrhaphy anterior for cystocele and colporrhaphy posterior for rectocele were also performed regarding the limited dissection of the vesicovaginal and rectovaginal spaces, and fixing the mesh at a higher level of the cervix. Fixing the mesh at a lower level of the cervix by appropriate extensive dissection could be considered in our consecutive patients. By this way, additional colporrhaphy procedures probably will not be required. However, the quite anterior insertion and the axis of our device inevitably bend the uterine axis anteriorly, generating a posterior department decom-pensation. Therefore, the need for the repair of the posterior compartment should be kept in mind after the completion of our procedure. Additionally, although polyester sutures were used



Fig. 1. Lateral application of the polypropylene mesh with a special device via retroperitoneal tunneling.