Early Magnetic Resonance Imaging (MRI) findings after laparoscopic sacral colpopexy (LSCP): a preliminary study

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Authors: C. Bourgioti¹, K. Chatoupis², D. Zacharakis¹, E. Panourgias¹, S. Athanasiou¹, T. Grigoriadis¹, L. Moulopoulos¹, ¹Athens/GR, ²Marousi-Athens/GR
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Aims and objectives

Uterovaginal or vaginal vault prolapse is a common gynecological problem which may have a major impact on the quality of women's life. Interestingly, 1/10 women by the age of 70 years will receive surgical repair for pelvic floor prolapse. Its incidence increases with the age and it is strongly associated with parity [1].

Surgical repair is the standard treatment for pelvic organ prolapse. Laparoscopic sacrocolpopexy (LSCP) with use of a synthetic mesh is one of several surgical treatment options, proved to be very effective in restoring pelvic anatomy. LSCP has a considerably lower recurrence rate compared to conventional surgical techniques. It is also associated with fewer postoperative complications and shorter recovery times. However, LSCP remains unpopular among surgeons because it is time-consuming and highly dependent on surgical expertise [2, 3].

LSCP uses a synthetic mesh to bridge and suspend the upper vagina to the lumbosacral region (LSR). Occasional complications, such as foreign body reaction, osseous or disk infection at the LSR or mesh erosion/infection have been reported, most often within two years after surgery. Magnetic Resonance Imaging (MRI) is the modality of choice to assess mesh positioning, postoperative complications and recurrence of organ prolapse [4, 5].

There are no published data on whether bone marrow endplate changes at the site of the attachment of the mesh, could complicate the postoperative course of patients undergoing LSCP. The aim of this study was to evaluate the LSR with MRI before and 3, 12 and 24 months after LSCP in order to record any correlation between bone or soft-tissue changes with complications of mesh placement.
Methods and materials

During a six-month period, 30 patients were treated with LSCP. All patients had a grade IV uterovaginal (n= 12) or vaginal vault prolapse (n=18) on clinical examination. Patient-age ranged from 44 - 67 years (mean: 54 years). All 30 patients had an uneventful early postoperative course. Seventeen/30 patients have, so far, completed the first follow-up with MRI.

Surgical technique

In our institution, sacrocolpopexy is performed via a laparoscopic route. A synthetic mesh of polypropylene material is used for the suspension of the vagina to the sacral promontory. The mesh is anchored to the anterior longitudinal ligament. Fixation of the mesh to both anterior ligament and posterior vaginal wall is achieved with nonresorbable stiches. In cases of uterovaginal prolapse, concurrent supracervical hysterectomy is also performed. Postoperative MRIs were obtained 3, 12 and 24 months after surgery.

MRI study

A baseline pre-op MRI study of the LSR was performed in all patients. All MRIs were performed with a 1.5T unit, using a phased-array coil. Our MRI protocol for the evaluation of lumbar spine included the following sequences:

- **Sagittal T2-w FSE** (TR=3500ms, TE=100ms, NSA=6, Gap= 0.4mm, ST=4mm, FOV A-P =175mm)
- **Sagittal T1-w FSE** (TR=400ms, TE=7.4ms, NSA=4, Gap= 0.4mm, ST=4mm, FOV A-P=175mm)
- **Sagittal STIR** (TR= 2500/170ms, TE=60ms, NSA=4, Gap= 0.8mm, ST=4mm, FOV A-P=150mm)
- **Axial T2-w FSE** (TR=4120ms, TE=120ms, NSA=8, Gap=0.4mm, ST=4mm, FOV R-L=107mm) from the level of L3-L4 to L5-S1, parallel to each disc
- **Axial T1-w FSE** (TR=600ms, TE=7.8ms, NSA=4, Gap=0.8mm, ST=4mm, FOV R-L=150mm) from the level of L3-L4 to L5-S1
- **T2-w FSE** images of the whole pelvis (including the sacral promontory and the perineum) were obtained in both axial and sagittal plane to evaluate pelvic organ prolapse (TR=2800ms, TE=90ms, NSA=3, Gap=1mm, ST=4mm, FOV A-P=289mm).

All MRIs were reviewed by two expert radiologists (reader 1:20 years of experience, reader 2:7 years of experience) and a consensus was reached.
Degenerative changes of the endplates, facet joints and intervertebral disc, as well as any bone marrow or soft-tissue abnormality at the LSR were recorded on both pre-and postoperative MRIs.

So far, 17/30 patients have completed the 3-month MRI follow-up. All patients were asymptomatic at follow-up.
Results

On preoperative MRIs, 25/30 patients had moderate to severe degenerative changes of the endplates (n=17), intervertebral disc (n=15) or facet joints (n=15) at L5-S1. Incidental findings observed in 8/30 patients included transitional vertebrae (n=1), perineural cysts (n=2) and vertebral haemangiomas (n=2).

On all 17 early postoperative MRIs, there was no alteration in the appearance of any change at the LSR.

Evaluation of mesh integrity is of critical importance, since mesh erosion is not rare (reported incidence up to 3.4%) and its presence requires immediate resection [6]. In our study, all post-operative MRIs clearly demonstrated the mesh. On T2-w and T1-w images, the mesh was seen as a low-signal intensity structure extending from the vaginal wall to the LSR (Figure 1). The site of attachment of the mesh to the vagina was demonstrated as an area of focal vaginal wall thickening (Figure 2,3). The sacral point of the fixation of the mesh was demonstrated as a low-intensity stucture attached to sacral promontory (Figure 4,5). Low-signal intensity may be related to fibrosis induced by the mesh placement, to the mesh itself or both [5].

According to literature data, potentially life-threatening conditions like osteomyelitis or spondylodiscitis at the LSR along with mesh infections may occur in patients treated with LSCP [7]. So far, none of our 17 patients who had follow-up MRIs showed evidence of new bone marrow or soft tissue changes at the LSR.
Fig. 1: Sagittal T1-weighted MR image of a 57-year-old patient, three months after LSCP. The synthetic mesh is clearly seen, extending from the vaginal vault to the LSR (arrows). There is no evidence of pathological bone marrow or soft tissue changes at LSR.

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Fig. 2: A 54-year-old woman with severe pelvic floor prolapse, treated with LSCP. Pre-op sagittal T2-weighted image demonstrates uterine prolapse (white arrow). Note severe degenerative endplate changes at L5-S1 (black arrow).

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Fig. 3: Sagittal T2-weighted image of the same patient as in Fig.2, three months after LSCP. Note the attachment of the mesh to the vaginal vault (white arrow).

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**Fig. 4:** Sagittal T2-weighted image of the same patient as in Fig.2, three months after LSCP. Note the attachment of the mesh to the sacral promontory (white arrow). L5-S1 degenerative endplate changes show no change.

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Fig. 5: Axial T2-weighted image of a 65-year-old patient, three months after LSPC. Note the attachment of the mesh to the sacral promontory (white arrow). Also seen is a large perineural cyst eroding the left side of the sacrum (black arrow).

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Conclusion

Initial study results show no interval MRI changes in the LSR early after LSCP. It seems, therefore, that new bone marrow or soft-tissue changes at MR images of the LSR early (3 months) after the insertion of a synthetic mesh, do not constitute a normal postoperative finding of this procedure. Although our study is still in progress, degenerative disease at L5-S1 do not seem to predispose patients undergoing LSCP for inflammatory processes like foreign body reaction or osseous/disc infection.
References


