Laparoscopic repair of wide and deep uterine scar dehiscence after cesarean section

Olivier Donnez, M.D., Pascale Jadoul, M.D., Jean Squifflet, M.D., and Jacques Donnez, M.D., Ph.D.

Department of Gynecology, Université Catholique de Louvain, Cliniques Universitaires Saint-Luc, Brussels, Belgium

Objective: To propose a new laparoscopic technique for repair of scar dehiscence after cesarean section.
Design: The dehiscent scars were evaluated by ultrasound, hysterography, hysteroscopy, and magnetic resonance imaging. The results were correlated with those after laparoscopic repair.
Setting: University hospital.
Patient(s): Three patients underwent cesarean section and presented with symptomatic dehiscence at the level of the incision.
Intervention(s): Laparoscopic repair of the dehiscence, including excision of the fibrotic tissue and laparoscopic closure of the anterior uterine wall.
Main Outcome Measure(s): Evaluation by ultrasound and magnetic resonance imaging of the sagittal depth of the scar and the thickness of the residual myometrium covering the dehiscence.
Result(s): The defect was completely corrected by laparoscopic repair in all cases.
Conclusion(s): Evaluation of uterine scar dehiscence after cesarean section can be performed by ultrasound and magnetic resonance imaging, and laparoscopic surgical repair may be performed with good postoperative anatomic outcomes. (Fertil Steril® 2008;89:974–80. ©2008 by American Society for Reproductive Medicine.)

Key Words: Cesarean section, dehiscence, scar, laparoscopic repair

Cesarean section is the most commonly performed surgery in obstetrics, and its incidence is on the increase, with rates as high as 17% to 25% in some countries (1). In certain cases, resulting scar dehiscence may lead to uterine rupture during pregnancy and delivery procedures, with ensuing maternal and fetal morbidity. Nevertheless, in 1997, the Clinical Audit Unit of the Royal College of Obstetricians and Gynaecologists (United Kingdom) recommended that women who previously have had a cesarean section should be actively considered for subsequent vaginal delivery (2). After cesarean section, the risk of uterine rupture in women with previous vaginal delivery is low (<1%) when labor is induced (3). But without prior vaginal delivery, the risk of uterine rupture is likely to be between 1% and 5% and is unlikely to be reduced by the use of modern technologies. Moreover, cesarean scar dehiscence can be a site for developing extrauterine pregnancy. In such cases, uterine rupture can be prevented by a medical approach or surgical procedures (4). Extrauterine pregnancy in a dehiscent cesarean scar has been described after embryo transfer in case of IVF (5). Cesarean scar defects also have been reported to be etiological factors in many clinical conditions, such as dysmenorrhea (6) and intermenstrual bleeding (7–9).

Vaginal or laparoscopy-assisted vaginal approaches can be undertaken for repair of suspected scar dehiscence after cesarean section (8), with patients remaining free of pelvic pain and irregular menstrual bleeding. Here, we report a hitherto not-described technique of cesarean scar dehiscence repair exclusively by laparoscopy. This technique was successfully used to treat three patients in our department.

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Reprint requests: Jacques Donnez, M.D., Ph.D., Department of Gynaecology, Université Catholique de Louvain, Cliniques Universitaires St Luc, Avenue Hippocrate 10, 1200 Brussels, Belgium (FAX: 32-2-764-95-07; E-mail: donnez@gyne.ucl.ac.be).

MATERIALS AND METHODS

The patients were, respectively, 32, 30, and 36 years of age at the time of diagnosis. Their obstetric history showed that they had undergone cesarean section for different reasons, such as breech presentation and preeclampsia. The third patient underwent a second cesarean section for an unfavorable cervix at the end of pregnancy. None of these patients had experienced vaginal delivery in the past. All of them had been trying to conceive for >1 year by the time that they were referred to our department. The main complaint was pelvic pain at the hypogastric level, increasing during menstruation, and one patient presented with metrorrhagia.

Clinical examination revealed both a normal uterus and adnexa. All three patients underwent ultrasound, hysterography, hysteroscopy, and MRI. Ultrasound was used to measure the depth and size (longitudinal) of the dehiscent scar and the thickness of the residual myometrium covering the dehiscence. These data were correlated to MRI findings by using T2-weighted images and T1-weighted images with saturation of fatty tissue.

After informed consent was obtained, laparoscopic repair was proposed to the patients. In all three cases, laparoscopy revealed a normal-sized uterus associated with normal adnexa. As observed in Figure 1a, the cesarean scar was easily distinguishable, and only the peritoneum and some layers of myometrium were found covering the dehiscence, as

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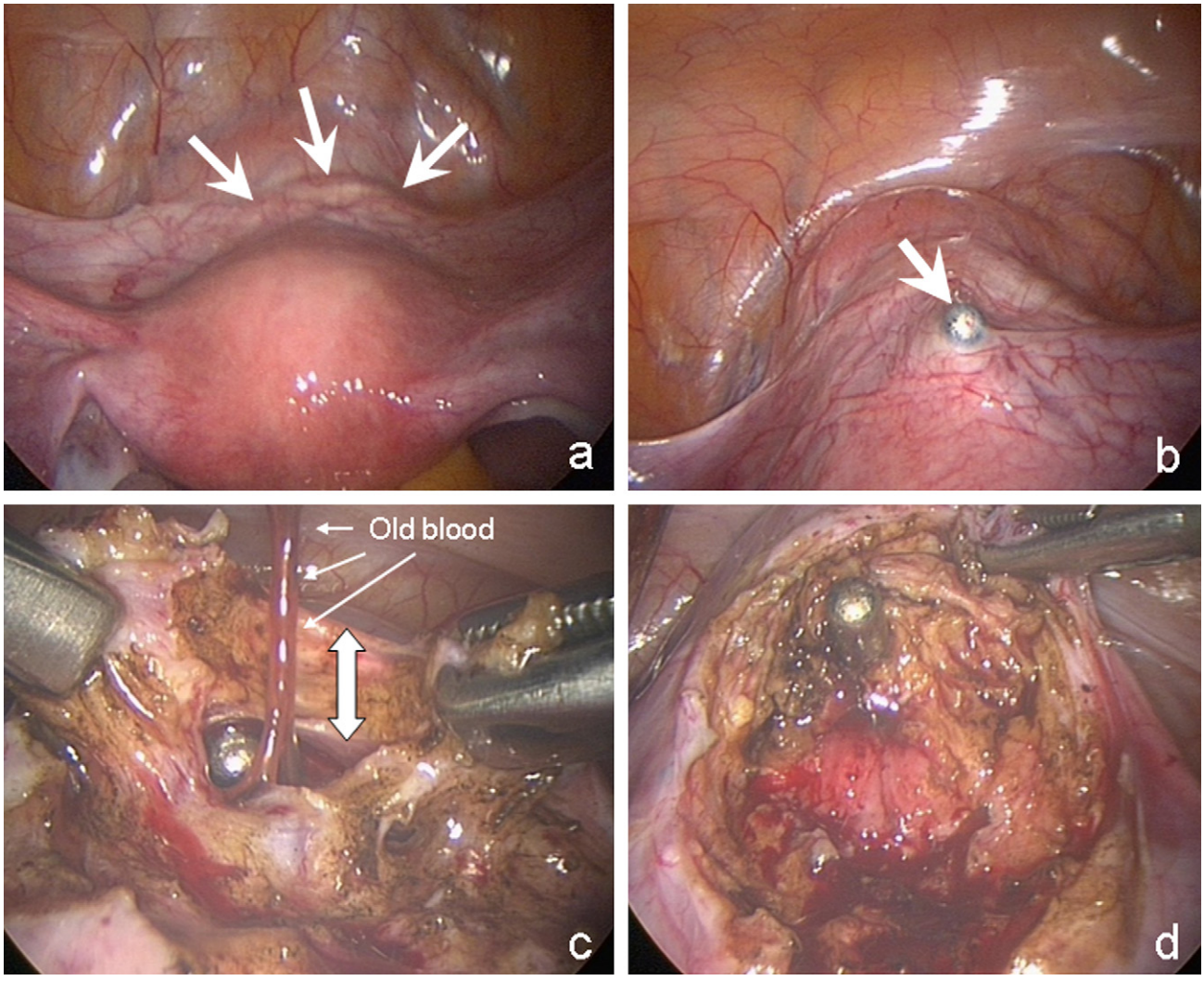
demonstrated by inserting a probe through the cervix into the dehiscent scar (Fig. 1b). The peritoneum then was opened to safely separate the bladder from the anterior wall. The lower uterine segment was only composed of a thin layer of fibrotic tissue covered with peritoneum.

By using CO_2 laser (Lumenis-Sharplan; Yokneam, Israel), we completely opened the scar from one side to the other. The fibrotic tissue then was excised from the edges of the cesarean scar to access healthy myometrium and facilitate further healing (Fig. 1c). The final view of the wide-open scar is shown in Figure 1d. Before closing the scar, a Hegar probe was inserted into the cervix to preserve the continuity of the cervical canal with the uterine cavity (Fig. 2a). Two separate sutures were placed on the two lateral sides of the scar by using 2–0 Vicryl and an SH needle (Johnson & Johnson, Hamburg, Germany; Fig. 2b). The scar was finally closed by using two more 2–0 sutures (Fig. 2c). It then was covered with peritoneum. The final view of the repair can be seen in Figure 2d. At the end of surgery, we performed a hysteroscopy to visualize the repair of the cervical canal. It showed complete correction of the defect and normal permeability of

FIGURE 1

(**a**) With the magnification provided by the laparoscopic view, access to the cesarean scar was easy, and the dehiscence was clearly identified (*white arrows*). (**b**) A probe (*white arrow*) was inserted through the cervix into the dehiscent scar. (**c**) The anterior uterine wall (*thick white arrow*) was composed of a thin layer of fibrotic tissue covered with peritoneum. Complete resection of the fibrotic tissue was mandatory to facilitate further healing. The presence of old blood is indicated by *thin white arrows.* (**d**) Final view of the opened dehiscent scar after resection of the fibrotic tissue with the CO_2 laser.



Donnez. Uterine scar dehiscence repair. Fertil Steril 2008.

the cervix. During these surgical procedures, no complications occurred. The patients were discharged from the hospital in the 24 hours after surgery. We recommended the use of oral contraceptives for 3 months.

RESULTS

In the course of the preoperative examinations, ultrasound revealed normal-sized uteri and adnexa, but liquid retention was observed at the level of the cesarean section scar in all cases. In the longitudinal view, the depth of the dehiscence was evaluated to be, respectively, 4.6, 10.8, and 15 mm from the endocervix to the residual myometrium covering the cesarean scar. The thickness of the residual myometrium of the anterior uterine wall was <1 mm in the first two cases and was 2.1 mm in the last case.

Magnetic resonance imaging (MRI) then was performed and confirmed the presence of both a normal uterus and ovaries. The thickness of the lower uterine segment was observed on sagittal and transverse images of the MRI scan. As shown in Figure 3a and b, sagittal and transverse views of T2-weighted images allowed us to observe the anterior scar dehiscence covered with a very thin layer of residual tissue. By using T1-weighted images with saturation of fatty tissue, hypersignals were detected in the uterine cavity and the dehiscent scar that were highly suggestive of menstrual blood retention in the cavity and the cesarean scar (Fig. 3c).

Hysterography and hysteroscopy were performed. As shown in Figure 3d, hysterography revealed wide scar dehiscence at the level of the cesarean section. Hysteroscopy allowed us to visualize the dehiscence of the cesarean scar running along the whole breadth of the anterior uterine wall

FIGURE 2

(**a**) A Hegar probe (*white arrow*) was inserted through the cervix to preserve the permeability of the cervical canal before suture. (**b**) Two separate sutures were placed on each side of the scar. (**c**) A separate suture completed the closure of the scar. (**d**) Final view of the scar after it was covered with peritoneum.

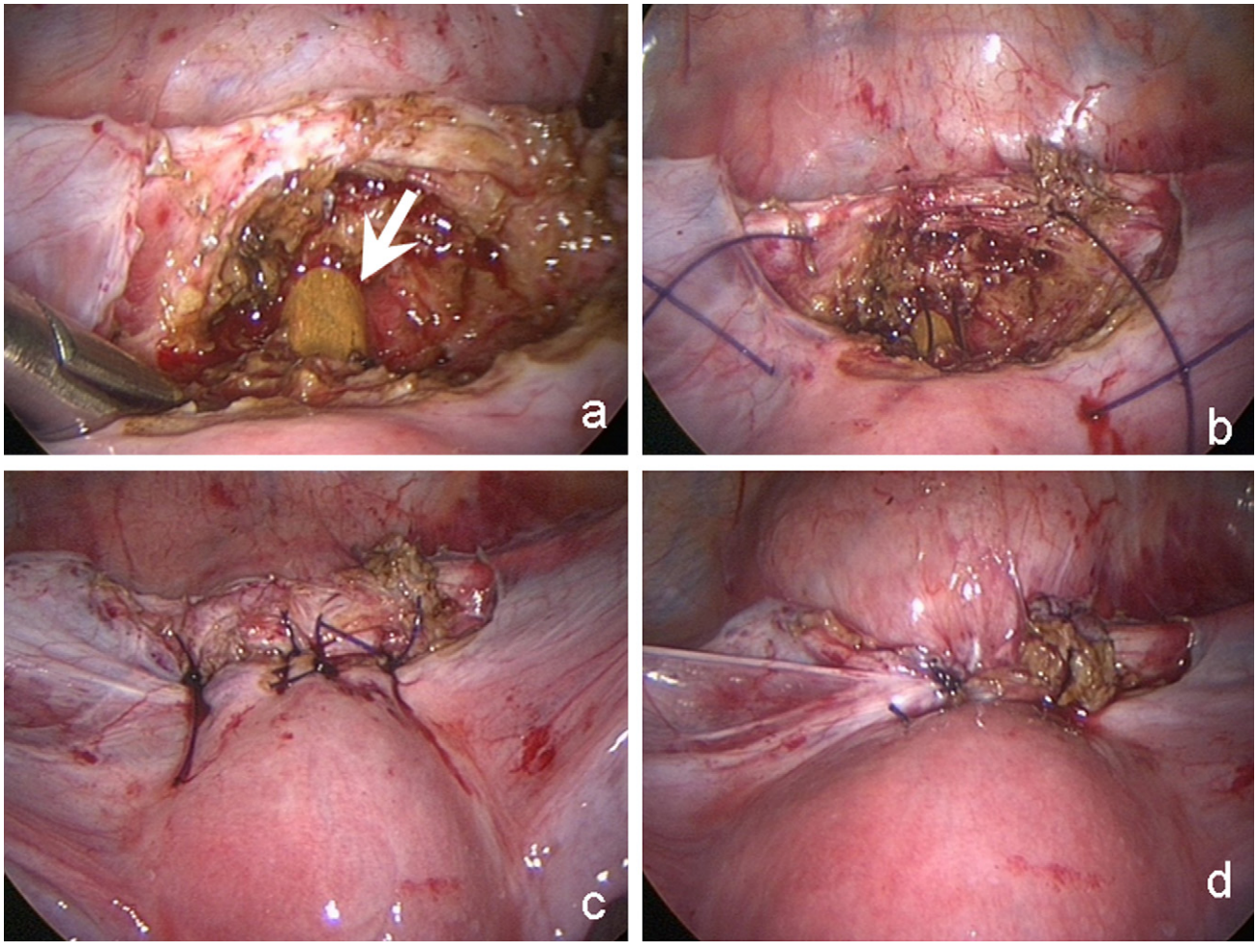


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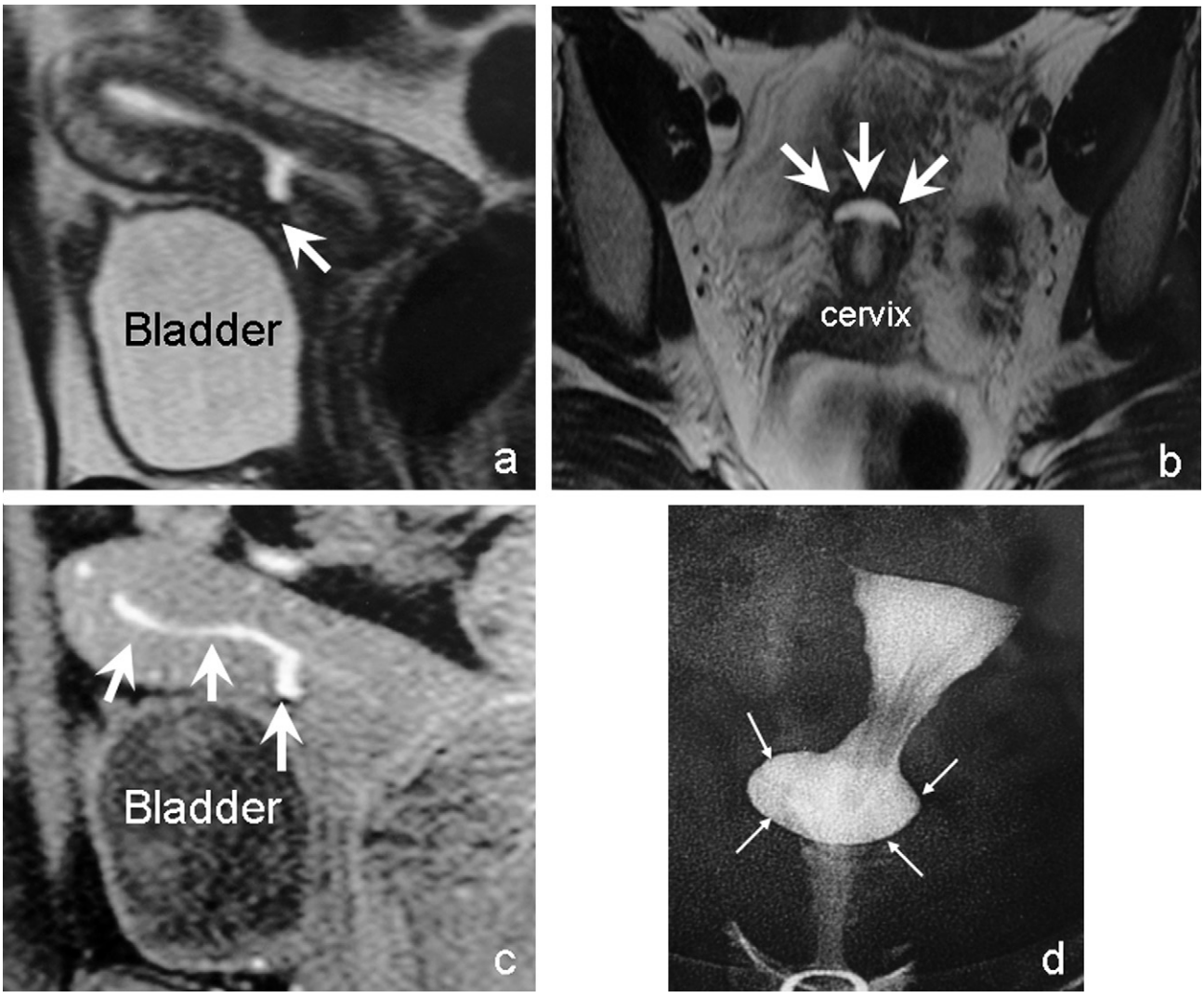
FIGURE 3

(**a**) Sagittal view of a T2-weighted image showed a normal uterus. The *white arrow* indicates deep dehiscence at the level of the cesarean scar. The residual tissue covering the scar was very thin. (**b**) Transverse view of a T2-weighted image from the same patient. The thickness of the anterior uterine wall and the size of the dehiscence can be clearly seen. *White arrows* indicate the thin tissue covering the scar. (**c**) Sagittal view of a T1-weighted image with saturation of fatty tissue showed hypersignals (*white arrows*) inside the uterine cavity, suggestive of menstrual blood retention. (**d**) Front view of the hysterography showed contrast inside the dehiscence (*white arrows*) at the level of the cesarean scar and allowed us to evaluate the size of the defect.



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and to confirm the presence of residual hematometra (Fig. 4a). Chocolate liquid was visible in the scar, highly suggestive of retention of old menstrual blood. Hysteroscopic visualization directly after the repair showed correction of the defect (Fig. 4b).

Three months after surgery, MRI revealed a uterus with a normal supraisthmic area at the level of the cesarean section in all three cases. In Figure 4c and d, a sagittal view of T2-weighted images of the same patient before and after surgery shows the repair of the anterior uterine wall and normal thickness of the myometrium. Ultrasonographic evaluation of the lower uterine segment confirmed the integrity of the anterior uterine wall in all cases. Before surgery, the residual myometrium covering the dehiscence measured <1 mm in two cases and 2.1 mm in one; after laparoscopic repair, it was found to measure 11, 9.4, and 10.1 mm, respectively. One of these patients became pregnant, and the pregnancy was unremarkable. The patient underwent cesarean section at 38 weeks, and no dehiscence was observed in the lower uterine

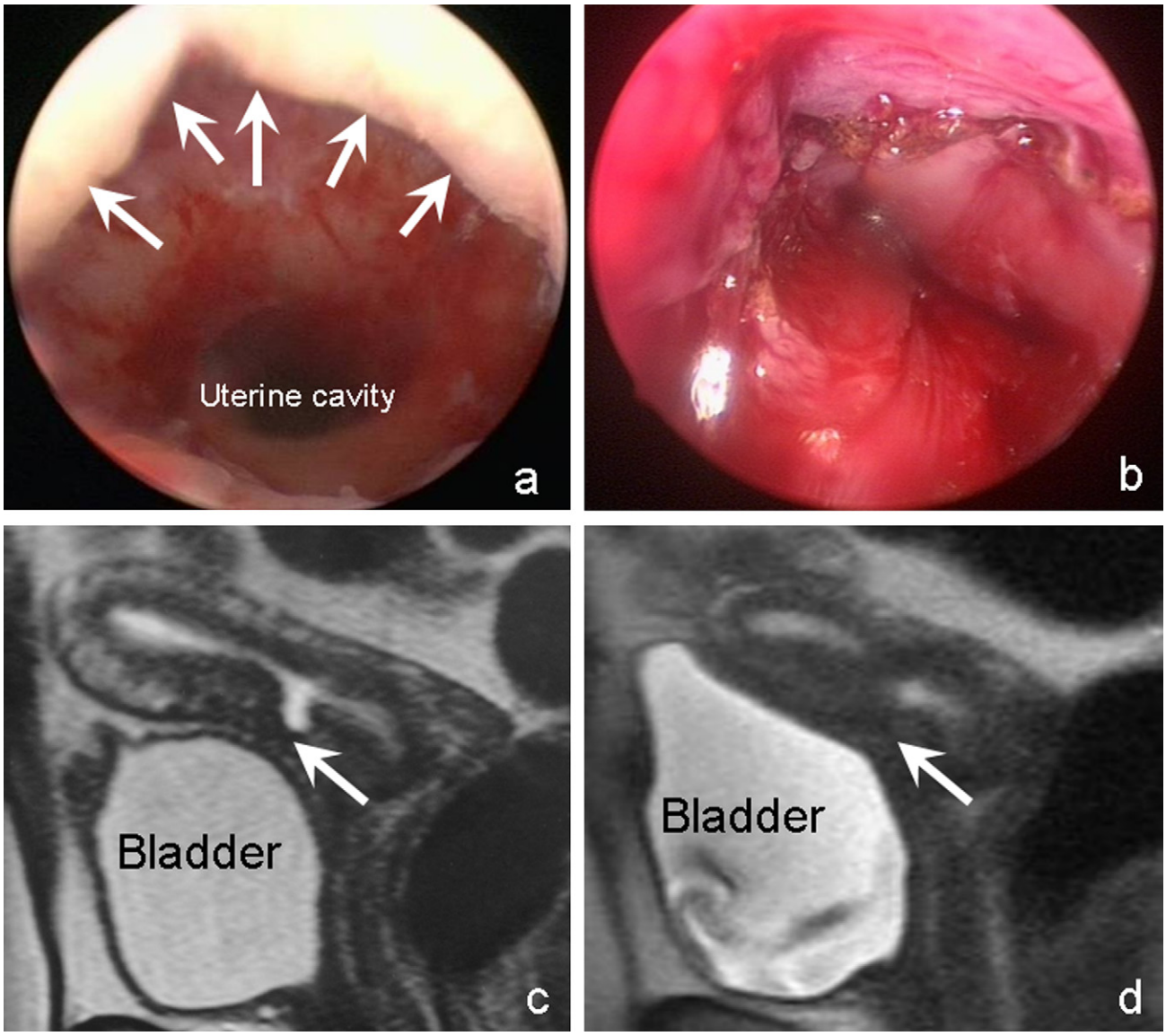
segment. In case of pregnancy, the lower uterine segment must be carefully monitored, and cesarean section should be performed at 38 weeks of pregnancy to avoid the risk of uterine rupture during labor.

DISCUSSION

Uterine rupture remains the most feared complication of pregnancy and labor in women who have undergone previous cesarean delivery. Different imaging modalities, from hysterography to ultrasonographic evaluation, have been used to evaluate the integrity of the anterior uterine wall. Even if hysterography and hysteroscopy are not known to be especially useful (10, 11), they nevertheless allow good visualization of the depth and width of the dehiscence at the level of the cesarean scar. They do not, however, provide any information on the thickness of the residual myometrium covering the dehiscence.

FIGURE 4

(**a**) Hysteroscopic view of the cervical canal showed an anterior pseudocavity at the level of the dehiscence and the defect running along the whole breadth of the anterior uterine wall. It also confirmed the presence of residual hematometra. (**b**) Hysteroscopy performed immediately after suture showed complete correction of the defect and normal permeability of the cervix. (**c**, **d**) Sagittal view of T2-weighted images before (**c**) and after (**d**) laparoscopic repair showed the depth of the cesarean scar, which was easily assessed and found to be wholly acceptable compared with preoperative investigations. The dehiscence had disappeared.



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In the literature, ultrasonographic monitoring of the lower uterine segment during pregnancy has been described. The critical cutoff value for lower uterine segment thickness that allows trials of labor is 2.5 mm (12). Ultrasonographic evaluation of a 1.5-mm lower uterine segment during pregnancy has a sensitivity of 88.9% and a negative predictive value of 96.2% in predicting a dehiscent lower uterine segment, suggesting that ultrasonography potentially can be used to predict the risk of uterine rupture during labor (13).

In the literature (14, 15), a filling defect after cesarean section, or a so-called niche, was defined as a triangular anechoic structure at the presumed site of incision. The depth of the niche was described to be between 4.2 and 6.17 mm. In the cases we report here, the niches measured between 4.8 and 15 mm. Regnard et al. (15) found that in patients with a niche, the residual myometrium measured 6.5 $\pm$ 2.7 mm (range, 0–10.9 mm), and in those without a niche, it measured 8.9 $\pm$ 2.0 mm (6.0–13.9 mm). A *dehiscence* was defined as a niche whose depth was $\geq$80% of the anterior myometrium. The residual myometrium of the three patients in this study measured $<$1 mm in two cases and 2.1 mm in one case. It is interesting to note that all three patients demonstrated blood retention in the dehiscent scar, which probably was responsible for their increasing pelvic pain and dysmenorrhea, as described elsewhere in the literature (6–9). After surgery, the pelvic pain and dysmenorrhea disappeared. One patient immediately became pregnant upon stopping oral contraceptives. Old blood retention in the uterine cavity and the dehiscent scar, as reported in case of severe uterine adenomyosis, may create a toxic environment for embryo implantation and be related to infertility (16, 17).

In the light of these results, should we change the surgical technique used to close the anterior incision during cesarean section? In the cases that we describe, we do not have any information about the surgical technique that was used to close the anterior uterine wall. In a randomized prospective study of 78 patients, Yazicioglu et al. (18) analyzed two different techniques (full thickness, including the endometrial layer, and split thickness, excluding the endometrial layer) and found that by selecting a full-thickness suturing technique, one may significantly lower the incidence of incomplete healing of the uterine incision after cesarean section. The occurrence of a defective uterine scar after cesarean section depended on multiple factors, including the degree of cervical dilatation and possibly the contractile effort of the uterine musculature, resulting in thinning at the uterine incision site.

Many surgical techniques have been proposed to correct defects at the level of the cesarean section incision. Fabres et al. (9) proposed hysteroscopic resection of the fibrotic tissue to successfully treat patients with intermenstrual bleeding that was caused by cesarean scar defects. Klemm et al. (8) used combined laparoscopic–vaginal as well as purely vaginal approaches to repair defects caused by dehiscent cesarean scars in five patients. We report a hitherto not-described laparoscopic technique. The laparoscopic approach offers an optimal view during dissection of the vesico-vaginal space, which allows us to safely separate the bladder from the anterior uterine wall and thereby avoid bladder injuries. Recovery is also widely recognized to be faster with laparoscopy than laparotomy, requiring a shorter hospital stay. A further advantage of this technique is recovering the integrity of the anterior uterine wall, as confirmed by subsequent ultrasonographic and MRI evaluation.

Ultrasonographic evaluation of the anterior uterine wall and MRI are useful to evaluate the thickness of the lower uterine segment in symptomatic women who experience increased pelvic pain, dysmenorrhea, or infertility after cesarean section. In case of deep cesarean scar dehiscence with residual myometrial thickness of $<$2.5 mm, or when the niche accounts for $\geq$80% of the anterior uterine wall, laparoscopic surgical repair may be performed, with good postoperative anatomic outcomes.

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