Management of Hernias in Pregnancy

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**BACKGROUND:** Even though groin and umbilical hernias are rare in adult women, the rarer cases of pregnant women presenting with hernias create distinct challenges to treatment planning. The course of hernias in pregnant women, the effect of hernias on delivery, and the timing of elective herniorrhaphy have not been established. To date, there have been no published series establishing that postpartum repair of umbilical and groin hernias that develop in pregnancy is safe and acceptable.

**STUDY DESIGN:** From September 2004 to July 2006, 12 female patients with groin or umbilical hernias occurring during pregnancy presented to a single surgeon at the Mount Sinai Medical Center. All patients later underwent postpartum herniorrhaphy and were enrolled retrospectively. All patients underwent either open umbilical or inguinal hernia repair primarily or using a plug-and-patch method (Bard Mesh PerFix Plug; Davol) in an ambulatory setting. Mean long-term followup was 17 months.

**RESULTS:** Mean age of the patients was 35 years (range 27 to 41 years). The most common type of hernia was inguinal (58%). The predominant side was right (86%). None of the patients had an associated diagnosis or clinically significant medical history. All patients were evaluated, operated, and followed up by the same surgeon. Neither incarceration nor strangulation occurred in any patient before or after delivery. None required hospitalization or emergent hernia repair. Patients did not experience any delivery complications. All patients underwent elective postpartum open hernia repair with sedation and local anesthesia (4 to 52 weeks postpartum; mean 22 weeks postpartum). No patient experienced any perioperative or postoperative complications. None of the patients experienced a hernia recurrence. Four patients had subsequent uncomplicated pregnancies.

**CONCLUSIONS:** This series lends support to the “watchful waiting” strategy during pregnancy, with a plan for postpartum herniorrhaphy. Elective, postpartum hernia repair provides similar results to the nonpregnant population. (J Am Coll Surg 2008;207:539–542. © 2008 by the American College of Surgeons)

An estimated 800,000 groin hernia repairs and 175,000 umbilical hernia repairs occurred in the US in 2003. It is widely known that groin hernias are far more common in men, with inguinal hernias occurring seven times more frequently in men than women. Women of childbearing age, especially pregnant women, present unique challenges in planning surgical intervention. Risks of nonoperative management during pregnancy, including incarceration, could be devastating to the health of the mother and fetus. The potentially teratogenic effects of anesthesia or surgical complications could be equally dangerous. The course of hernias in pregnant women, the effect of hernias on delivery, and the timing of elective herniorrhaphy have not been established. To date, there have been no published series establishing that postpartum repair of umbilical and groin hernias that develop in pregnancy is safe and acceptable.

**METHODS**
From September 2004 to July 2006, 12 female patients with groin or umbilical hernias occurring during pregnancy presented to a single surgeon at the Mount Sinai Medical Center in New York City. All patients later underwent postpartum herniorrhaphy and were retrospectively enrolled. All patients underwent either open umbilical or inguinal hernia repair primarily or using a plug-and-patch method (Bard Mesh PerFix Plug; Davol) in an ambulatory setting. Patients were examined at approximately 2 weeks and 3 months postoperatively. Long-term followup was completed by phone call, with a mean followup of 17 months.
months. Office records and telephone interviews were used to collect followup data, with all telephone interviews performed by two reviewers using a standardized questionnaire. Recurrences were explored by physical examination and patient report.

RESULTS
Patient characteristics are summarized in Table 1. A hernia was diagnosed in 12 pregnant patients during the study period, 2004 to 2007. Mean age of the patients was 35 years, with a range of 27 to 41 years. The most common type of hernia was inguinal (58%). The predominant side was right (86%). None of the patients had an associated diagnosis or clinically significant medical history. Most patients reported a bulging mass (92%) and pain (67%). Sixty-seven percent of patients noticed the hernia during their previous pregnancy, particularly during the second trimester (83%). All patients were evaluated, operated, and followed up by the same surgeon. All hernias were easily reducible on physical examination and were not associated with any obstructive symptoms. Neither incarceration nor strangulation occurred in any patient before or after delivery. None required hospitalization or emergent hernia repair. Patients did not experience any complications with delivery. Elevated leukocyte count (≥11,000/uL) was not observed in any patients.

All primary repairs were umbilical hernias (Table 1). Mesh was used for all medium- (2 to 4 cm; n = 5) and large-sized defects (>4 cm; n = 2). Estimated blood loss was recorded as minimal (mean 15 mL) in all patients. No patient experienced any perioperative or postoperative complications. Of the specimens sent for pathology, none was reported malignant.

Mean followup was 17 months. None of the patients experienced a recurrent hernia. Four patients had subsequent uncomplicated pregnancies.

DISCUSSION
Approximately 75% of all abdominal hernias occur in the groin. The incidence of abdominal hernias in female patients is lower than male patients; women account for approximately 8% of groin hernia repairs. They present emergently more often, with emergency hernia repairs occurring in 16.9% of women as opposed to only 5.0% of men. Recurrence rates in nonpregnant women are very low. A systematic review of randomized controlled trials published in 2000 reported a groin hernia recurrence rate of 1.4% with mesh repairs and 4.4% with nonmesh repairs in women.

Surgical decision making for nonpregnant women of childbearing age should not differ from standard recommendations. Abdominal hernias can be repaired safely with no demonstrated adverse effect on a later pregnancy. Abrahamson and Gorman reported a series of 27 patients with primary ventral hernia repairs before pregnancy. They documented no recurrence during or after subsequent pregnancies.

Surgical planning for pregnant women with hernias can

### Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age at operation (y)</th>
<th>Type of hernia</th>
<th>Hernia diagnosed during pregnancy, no.</th>
<th>Hernia diagnosed at trimester, no.</th>
<th>Operation at postpartum week, no.</th>
<th>Repair method</th>
<th>Complications</th>
<th>Recurrence</th>
<th>Subsequent pregnancies</th>
<th>Postoperative followup</th>
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<tbody>
<tr>
<td>1</td>
<td>32</td>
<td>Inguinal</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>PP</td>
<td>None</td>
<td>None</td>
<td>No</td>
<td>37 mo</td>
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<td>2</td>
<td>41</td>
<td>Umbilical</td>
<td>1</td>
<td>2</td>
<td>52</td>
<td>PP</td>
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<td>None</td>
<td>Yes</td>
<td>34 mo</td>
</tr>
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<td>3</td>
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<td>2</td>
<td>4</td>
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<td>None</td>
<td>Yes</td>
<td>29 mo</td>
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<td>4</td>
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<td>3</td>
<td>24</td>
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<td>None</td>
<td>Yes</td>
<td>27 mo</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>Inguinal</td>
<td>4</td>
<td>2</td>
<td>24</td>
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<td>None</td>
<td>No</td>
<td>20 mo</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
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<td>1</td>
<td>2</td>
<td>16</td>
<td>Patch</td>
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<td>None</td>
<td>No</td>
<td>2 wk</td>
</tr>
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<td>7</td>
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<td>3</td>
<td>2</td>
<td>8</td>
<td>Primary</td>
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<td>None</td>
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<td>13 mo</td>
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<tr>
<td>8</td>
<td>36</td>
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<td>2</td>
<td>2</td>
<td>28</td>
<td>Primary</td>
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<td>None</td>
<td>No</td>
<td>14 mo</td>
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<tr>
<td>9</td>
<td>36</td>
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<td>2</td>
<td>2</td>
<td>28</td>
<td>Primary</td>
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<td>None</td>
<td>No</td>
<td>14 mo</td>
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<td>10</td>
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<td>2</td>
<td>8</td>
<td>PP</td>
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<td>None</td>
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<td>11</td>
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<td>2</td>
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<td>PP</td>
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<td>None</td>
<td>No</td>
<td>13 mo</td>
</tr>
<tr>
<td>12</td>
<td>36</td>
<td>Inguinal</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>PP</td>
<td>None</td>
<td>None</td>
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<td>3 mo</td>
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</table>

Patch, primary repair with mesh overlay; PP, plug and patch; Primary, primary repair only.
be more complicated. Hiatal hernias are the most common type of hernia in pregnant patients, occurring in 15% to 20% of pregnant women. Groin hernias are much less common. Prevalence of inguinal hernia in pregnancy has been estimated at only 1:2,000. Although incarcerated groin hernias are the second most common cause of intestinal obstruction in the general population, these cases account for < 5% of obstruction during pregnancy.

Surgical decision making for pregnant patients can be challenging. We found that most patients present with symptoms in the second trimester. Patients with asymptomatic groin or umbilical hernias will often become more symptomatic during the course of their pregnancy, as abdominal girth grows. As would be expected, no patients in our study presented with incarceration.

Performing open umbilical and inguinal herniorrhaphy, with or without mesh, under local anesthesia is well described in the nonpregnant population. A repair using only local anesthesia could potentially impose no anesthetic risk to a fetus, as there are no published data associating teratogenesis in humans with reasonable levels of local anesthetics. When using regional anesthesia, spinal anesthesia is preferred over epidural or combined-spinal epidural, as it offers the least drug transfer for the degree of anesthesia achieved. The need for sedation or general anesthesia is always possible. In a pregnant patient, it is feasible that this possibility would be greater, given the tension a gravid uterus creates.

Maternal risk with general anesthesia during obstetric delivery is well documented, with a mortality risk ratio 16.7 times that for regional anesthesia. Fetal risk with anesthesia is less clear. Although almost every drug used in general anesthesia has shown to be teratogenic in some species, there is no clear evidence that any anesthetic agent is a definite human teratogen. In considering these actual maternal and potential fetal risks, all nonemergent operations should be deferred until after delivery. The repair of umbilical, inguinal, and ventral hernias during pregnancy is indicated only in the event of an incarceration or strangulation. There are only a few case reports in the international literature of uterine or fibroid incarceration of ventral hernias during pregnancy. The very low, almost negligible, rates of hernia incarceration during pregnancy are probably a result of the expanding uterus displacing the bowel and omentum up and out of the pelvis.

There is limited evidence suggesting that hernia repair at the time of cesarean section is an acceptable option. In a Swiss study of seven patients who went simultaneous cesarean section and inguinal or umbilical hernia repair, there was no increase in wound infection rates and no recurrences at 56 months mean followup. Intuitively, the laxity of the abdominal wall and the presence of an enlarged, hypertrophied uterus could weaken a repair.

In this limited sample, we have shown that pregnant patients presenting with reducible groin or umbilical hernias during pregnancy can safely be managed nonoperatively during their pregnancy. Importantly, all of our patients went on to have uncomplicated deliveries. Elective postpartum hernia repair provides similar results to the nonpregnant population. This series lends support to the “watchful waiting” strategy during pregnancy, with a plan for postpartum herniorrhaphy. Additional evidence supported by larger, prospective studies could provide more insight on the management of this population.

Author Contributions
Study conception and design: Buch, Tabrizian, Divino
Acquisition of data: Buch, Tabrizian
Analysis and interpretation of data: Buch, Tabrizian
Drafting of manuscript: Buch, Tabrizian, Divino
Critical revision: Buch, Tabrizian, Divino

REFERENCES