

## GYNECOLOGY

# Laparoscopic hysterectomy with morcellation vs abdominal hysterectomy for presumed fibroid tumors in premenopausal women: a decision analysis

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**OBJECTIVE:** The purpose of this study was to model outcomes in laparoscopic hysterectomy with morcellation compared with abdominal hysterectomy for the presumed fibroid uterus and to examine short- and long-term complications and death.

**STUDY DESIGN:** A decision tree was constructed to compare outcomes for a hypothetical cohort of 100,000 premenopausal women who underwent hysterectomy for presumed fibroid tumors over a 5-year time horizon. Parameter and quality-of-life utility estimates were determined from published literature for postoperative complications, leiomyosarcoma incidence, death related to leiomyosarcoma, and procedure-related death.

**RESULTS:** The decision-tree analysis predicted fewer overall deaths with laparoscopic hysterectomy compared with abdominal hysterectomy (98 vs 103 per 100,000). Although there were more deaths from leiomyosarcoma after laparoscopic hysterectomy (86 vs 71 per

100,000), there were more hysterectomy-related deaths with abdominal hysterectomy (32 vs 12 per 100,000). The laparoscopic group had lower rates of transfusion (2400 vs 4700 per 100,000), wound infection (1500 vs 6300 per 100,000), venous thromboembolism (690 vs 840 per 100,000) and incisional hernia (710 vs 8800 per 100,000), but a higher rate of vaginal cuff dehiscence (640 vs 290 per 100,000). Laparoscopic hysterectomy resulted in more quality-adjusted life years (499,171 vs 490,711 over 5 years).

**CONCLUSION:** The risk of leiomyosarcoma morcellation is balanced by procedure-related complications that are associated with laparotomy, including death. This analysis provides patients and surgeons with estimates of risk and benefit on which patient-centered decisions can be made.

**Key words:** abdominal hysterectomy, fibroid tumor, laparoscopic hysterectomy, morcellation

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Hysterectomy is the most common procedure performed in non-pregnant women in the United States; leiomyomata (fibroid tumors) is the indication for a significant proportion of these.<sup>1</sup> Surgeons increasingly are using laparoscopy for hysterectomy.<sup>2</sup> For all laparoscopic supracervical hysterectomies

## EDITORS' ★ CHOICE

and total laparoscopic hysterectomies in which the specimen is too large to be removed intact vaginally, the uterus must be morcellated (ie, cut into pieces that will fit through small incisions). If morcellation is not contained in a retrieval

bag, tissue may be unintentionally left behind, which can lead to spread of benign or malignant tissue.<sup>3,4</sup>

Morcellation has come under scrutiny regarding the risk of disseminating occult leiomyosarcoma, which was highlighted by a recent Food and Drug Administration safety notification.<sup>5</sup> Unlike other gynecologic malignancies, leiomyosarcoma is difficult to distinguish from benign disease preoperatively and bears a poor prognosis.<sup>6</sup> Retrospective studies suggest a worse prognosis with morcellation of leiomyosarcoma compared with intact removal of the uterus.<sup>7,8</sup>

Laparoscopic hysterectomy affords shorter hospital stay and convalescence compared with abdominal hysterectomy. In addition, laparoscopic hysterectomy is associated with less pain, lower blood loss, and lower rates of wound

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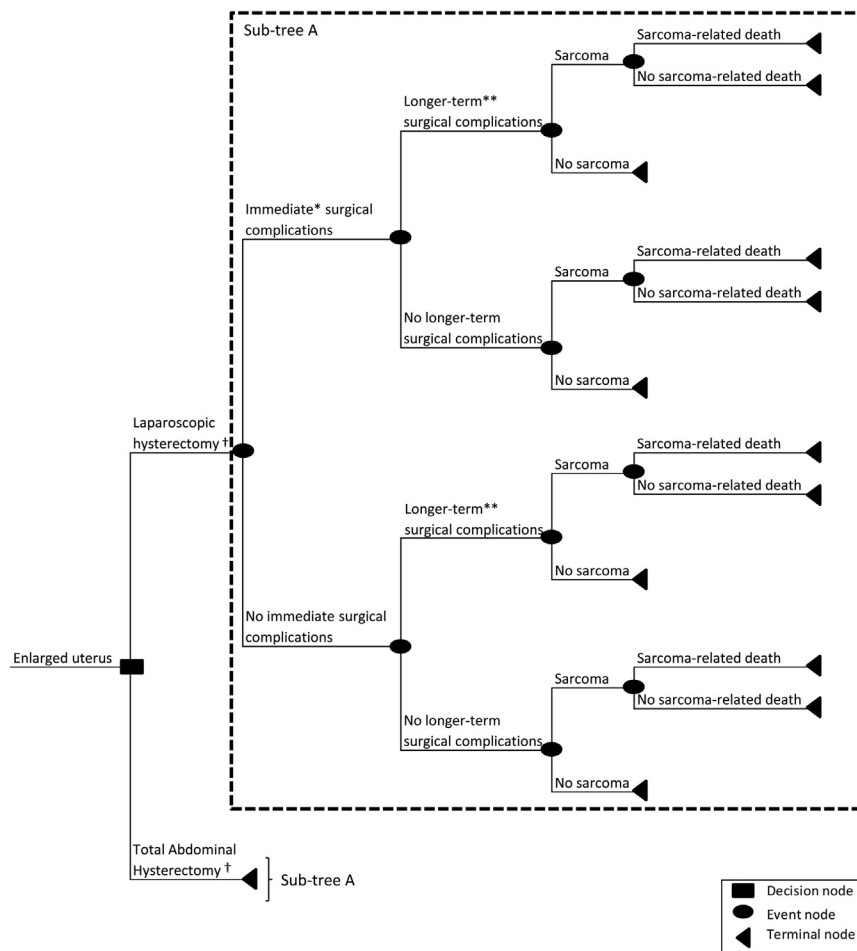
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**FIGURE 1**  
**Decision tree**



Premenopausal women whose condition requires hysterectomy for an enlarged uterus could undergo laparoscopic or abdominal hysterectomy. In either approach, death could occur immediately after the procedure. Women who survive the procedure could experience immediate surgical complications (blood transfusion, wound infection, or vaginal cuff dehiscence) and/or longer term surgical complications (hernia and venous thromboembolism). Women who had occult leiomyosarcoma at the time of the procedure would undergo treatment, after which point they could recover or die (sarcoma-related death).

Siedhoff. Laparoscopic vs abdominal hysterectomy. *Am J Obstet Gynecol* 2015.

infection, incisional hernia, and venous thromboembolism.<sup>9</sup> On the other hand, abdominal hysterectomy avoids the risk of morcellating leiomyosarcoma. To provide physicians with better estimates of health outcomes when they consider these surgical approaches, we conducted a decision analysis that compared laparoscopic hysterectomy to abdominal hysterectomy for the management of the

enlarged uterus with presumed benign leiomyomata in premenopausal women and examined mortality rates, surgical complications, and quality of life.

## MATERIALS AND METHODS

We constructed a decision tree to compare outcomes of laparoscopic hysterectomy with morcellation with abdominal hysterectomy for women with

an enlarged uterus because of presumed benign leiomyomata (Figure 1). We assessed a hypothetical cohort of 100,000 premenopausal women, because approximately 200,000 hysterectomies are performed for leiomyomata annually in the United States.<sup>1</sup> It made clinical sense that roughly one-half of those procedures could involve uteri large enough to require morcellation if considered for laparoscopic hysterectomy. The decision tree model was constructed using Excel 2010 (Microsoft Corporation, Redmond, WA) and TreePlan (TreePlan Software, San Francisco, CA).

Women who underwent both laparoscopic and abdominal hysterectomy were at risk for potential surgical complications, each represented as unique and independent health states in the model. Morbidity and mortality outcomes were evaluated over a 5-year time horizon. This study was considered exempt from review by the Institutional Review Board at the University of North Carolina at Chapel Hill because it involved analysis of existing published data. Three of the authors (S.W., S.R., and M.S.) were responsible for analyzing data.

Base-case estimates and ranges for each parameter and transition probabilities that govern movement between branches in the decision tree were determined by published literature review (Table 1). In the selection of estimates, preference was given to higher-quality studies and more recent publications that reflected advances in surgical practice. Surgical complications in the model included transfusion, abdominal wound infection, vaginal cuff dehiscence, venous thromboembolism, incisional hernia, leiomyosarcoma, death from leiomyosarcoma, and death from hysterectomy. Febrile episodes and vaginal cuff infections were considered but were believed to be better represented by identifiable and more objective diagnoses, wound infection, and cuff dehiscence. Major visceral and vascular adverse events were not included because they are rare and not significantly different between laparoscopic and abdominal hysterectomy.<sup>10</sup>

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