Resident Gynecologists and Total Hysterectomy

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**Department of Obstetrics and Gynecology, Hachinohe City Hospital, Hachinohe 031, and †Department of Obstetrics and Gynecology, Tohoku University School of Medicine, Sendai 980-77*

YAEHASHI, N., KURAMOTO, M., NAKAYAMA, C., NAKANO, M. and YAJIMA, A. *Resident Gynecologists and Total Hysterectomy.* Tohoku J. Exp. Med., 1996, 178 (3), 299-306 — We examined the specific number of surgeries necessary for a three-year obstetrics and gynecology resident to acquire proficiency in two types of hysterectomies. Improvement in the technical skills of the residents was assessed using surgical time and blood loss, and resected tumor weight was chosen as the factor representing the difficulty of the surgery. Regarding abdominal total hysterectomy (ATH), early residents (less than 25 ATH experience) performed relatively easier surgeries, and improvement in technical skill was manifested as reduced blood loss by mid residents (25 to 49 ATH) and as shortened surgical time by later residents (75 or more ATH). Regarding vaginal total hysterectomy (VTH), blood loss for earlier residents (less than 15 VTH) was greater than that for the staff, and there was a significant difference between staff surgical time and that for each resident group. These data suggest that performing more than 75 ATH during the residency period of three years is adequate to establish proficiency in this type of surgery, but that the execution of 25 VTH is insufficient and that residents require more training to learn VTH. ————— total hysterectomy; vaginal hysterectomy; abdominal hysterectomy; resident

Total hysterectomy, either abdominal or vaginal, is one of the important basic procedures in the field of obstetrics and gynecology (OBGYN) (Kovac et al. 1991; Wilcox et al. 1994; Kovac 1995; Sato et al. 1996). In Japan, one of the objectives during the OBGYN residency period is the acquisition by direct experience of the techniques to perform total hysterectomy safely and smoothly. However, there have been few reports describing the approximate number of surgeries necessary in each method of hysterectomy to attain that goal during the residency period. At Tohoku University School of Medicine, an OBGYN resident enters the OBGYN Resident Course soon after graduation from the medical school and passing the national examination for a medical doctor. Residents spend their first two

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months at Tohoku University Hospital learning the basic techniques used in the OBGYN field, and are then transferred to one of the hospitals affiliated with the University, where they work for three years with clinical staff who have over ten years of experience as OBGYN physicians. In this study, we analyzed some of the factors in total hysterectomy performed by residents and clinical staff to examine approximately how many surgeries should be performed by the resident to acquire technical skills to perform both abdominal and vaginal hysterectomies safely and smoothly.

PATIENTS AND METHODS

At the Department of Obstetrics and Gynecology, Hachinohe City Hospital, one of the hospitals affiliated with Tohoku University Hospital, 2035 total hysterectomies were performed between 1979 and 1986. Excluded from this study were radical or extended hysterectomy, supravaginal hysterectomy, Cesarean hysterectomy, vaginal hysterectomy with colporrhaphy, and hysterectomy in patients with lymphadenectomy, ovarian or tubal cancer, or adnexal tumors larger than the uterus. Three hysterectomies were also excluded because the surgical procedure was changed intraoperatively from vaginal to abdominal due to severe adhesions. The remaining 1761 hysterectomies were included in this study, of which 1186 were abdominal total hysterectomies (ATH) and 575 vaginal total hysterectomies (VTH). The postoperative diagnoses were leiomyoma and/or adenomyosis (endometriosis) in 1558 patients, endometrial hyperplasia in 35, cervical intraepithelial neoplasia in 104, gestational trophoblastic diseases in 35, and other diagnoses in 29. ATH was performed intrafascially in 1062 patients and extrafascially in 124. VTH was performed according to the technique described in the *Atlas of Vaginal Surgery* (Reiffenstuhl and Platzer 1975). Surgery was always performed by one resident and two staff members who each had specialized in Gynecology and Obstetrics for at least ten years. A staff physician performed surgery in cases that were expected to be difficult because of patient's obesity, polysurgery, position of tumor, severe adhesion, and so on. The first assistant was always one of the staff members and the second assistant in cases performed by resident was always one of the staff members to ensure that surgery proceeded smoothly. Each OBGYN resident performed a total of approximately 80 ATH and 25 VTH during the 3-year residency period. VTH training was started three months later than ATH training, so that each resident performed ten ATH in order to become familiar with the surgical anatomy of the pelvic organs before beginning to perform VTH. As a factor that might reflect the difficulty of the procedure, the total weight of the resected specimen was examined, and, as factors that could be interpreted as indicating improvement in the technical skill of the residents, surgical time and intraoperative blood loss were examined.

The analysis for ATH was conducted in four groups according to the number of hysterectomies previously performed by the OBGYN physicians, as follows:

A-Resident group (less than 25 ATH), B-Resident group (25 to 49 ATH), C-Resident group (50 or more) and staff group (Staff). As the number of VTH performed by residents was much smaller than that of ATH, VTH was conducted in the following three groups: residents in the first half of the resident program (Resident-1st half; less than 15 VTH), residents in the second half of the program (Resident-2nd half; 15 or more) and the staff group. All physicians in the staff group had at least ten years' experience in OBGYN and performed more than 500 ATH and more than 100 VTH. Three residents were included in each resident group.

Data are expressed as mean $\pm$ s.d. The difference between the two groups of parameters was evaluated by Student's *t*-test applied for calculations in the presence of a normal distribution. $p < 0.05$ was regarded as significant. Correlation analysis was made with Spearman's correlation coefficient.

RESULTS

Abdominal total hysterectomy (ATH)

No significant difference between intrafascial ATH and extrafascial ATH was found for any factor evaluated, and data for the two methods were therefore combined for further analysis. The number of hysterectomies performed by residents and staff was 229 and 957, respectively. A significant correlation was observed between time and blood loss (Spearman's correlation coefficient: $r_s = 0.57$, $p < 0.01$, $n = 1186$) and between weight of the resected specimen and blood loss ($r_s = 0.15$, $p < 0.01$, $n = 1186$), but not between time and weight ($r_s = -0.017$).

The mean total weight of hysterectomy specimens in each of the four groups (A-, B-, C-Resident, and Staff) was 324.8 ± 178.1 g, 360.8 ± 235.2 g, 415.2 ± 267.7 g, and 442.0 ± 418.4 g, respectively, and there was a significant difference between the weight for the Staff and those for the A-Resident and B-Resident groups (Fig. 1). In contrast, the mean weight for the C-Resident group was not significantly different from that for the Staff. As the total weight of the tumor specimens was

Fig. 1. Total weight of materials resected by ATH method. * $p < 0.05$.

Fig. 2. Blood loss during ATH. * $p < 0.05$.

thought to be generally related to the difficulty of the hysterectomy and increased weight was actually related to increased blood loss ($r_s = 0.15$, $p < 0.01$), these data suggest that the early residents performed the relatively easier surgeries.

Mean blood loss for the respective groups was 245.8 ± 108.2 g, 218.3 ± 133.4 g, 202.1 ± 137.5 g, and 219.1 ± 173.5 g, respectively (Fig. 2). Blood loss for the A-Resident group was significantly greater than that for the Staff, while there was no significant difference from the latter for the other two resident groups.

The mean surgical time for the respective groups was 84.6 ± 13.8 min, 76.3 ± 11.8 min, 72.5 ± 11.8 min, and 66.2 ± 14.6 min, respectively (Fig. 3). Surgical time had a tendency to decrease as the number of procedures performed by the resident increased, and there was a significant difference between the surgical time for each resident group and that for the Staff. In the investigation of time during the residency period at which the surgical times for the residents became comparable to those for the Staff, the C-Resident group was further divided into the early (less than 75 ATH) and late (75 or more ATH) C-Resident groups. The mean surgical

Fig. 3. Surgical time of ATH. * $p < 0.05$.

time for the two groups was 74.2 ± 12.4 min and 69.9 ± 10.4 min, respectively. Statistical analysis revealed that the surgical time for the early C group was significantly longer than those for the Staff, while there was no difference between the surgical times for the late C group and those for the Staff.

Vaginal total hysterectomy (VTH)

The number of VTH performed by residents and staff was 56 and 519, respectively. A significant correlation was observed between time and blood loss ($r_s = 0.64$, $p < 0.01$, $n = 575$), between weight of resected specimen and blood loss ($r_s = 0.18$, $p < 0.01$, $n = 575$), and between time and weight ($r_s = 0.16$, $p < 0.01$, $n = 575$).

The mean total weight of the resected specimens was 191.6 ± 95.0 g, 190.3 ± 85.9 g, and 211.3 ± 106.7 g for Resident-1st half, Resident-2nd half, and Staff, respectively. There were no significant differences among the groups (Fig. 4).

The blood loss for the respective groups was 222.2 ± 162.3 g, 171.9 ± 148.2 g, and 168.6 ± 132.4 g, respectively (Fig. 5). The blood loss for the Resident-1st half group was greater than that for either of the other groups, but the difference was not significant.

Fig. 4. Total weight of materials resected by VTH method.

Fig. 5. Blood loss during VTH.

Fig. 6. Surgical time of VTH. * $p < 0.05$.

The surgical time for each group was 60.9 ± 18.2 min, 55.8 ± 15.4 min, and 50.4 ± 14.7 min, respectively (Fig. 6). For VTH, the pattern of relationship between the number of VTH performed by a resident gynecologist and surgical time was the same as that for ATH. There was a significant difference from the Staff operation time for both resident groups.

Complications

Only severe surgical complications were recorded. Bladder injury occurred in three ATH (one by a resident and two by staff) and nine VTH (four by residents and five by staff). Ureter injury occurred in two ATH (both by staff) but not in VTH. Intestinal injury occurred in five ATH (two by residents and three by staff) and in one VTH (by staff). There was no significant difference either between ATH and VTH or between the residents and the staff in the frequency of each type of injury.

Severe postoperative hemorrhaging occurred in five ATH and in one VTH. For all patients, laparotomy, hemostasis and blood transfusion were performed as soon as the hemorrhage was noted. All were discharged from the hospital without any other problems within three weeks.

DISCUSSION

We examined the specific number of surgeries necessary for a three-year OBGYN resident to acquire proficiency in ATH and in VTH. Numerous factors can influence the difficulty of surgery, including the general condition of the patient, the method of anesthesia, severity of adhesions, the assistant's proficiency, and tumor size and position (Kovac et al. 1991; Wilcox et al. 1994; Kovac 1995; Sato et al. 1996). We chose resected tumor weight as the factor representing the difficulty of surgery because it is almost impossible to quantify any of the other factors listed above, except for tumor diameter. Actually the present data revealed that tumor weight significantly affected blood loss in both ATH and VTH.

Improvement of the operative technical skill of the residents was assessed

using the surgical time and blood loss. The same surgical methods and instruments were used throughout the period examined in this study, and the three staff members were always the same, eliminating some of the factors that could have influenced surgical time and blood loss.

In ATH, the increased weight of specimens significantly correlated with the increased blood loss, which indicated that the weight of specimens influenced the difficulty of surgery to a certain extent. Although A-residents performed easier procedures compared to those performed by the Staff, surgical times for the A-Resident group were longer and the blood loss was greater than those for the Staff. Similarly, for the B-Resident group, the resected weight was still lighter than that for the Staff and the surgical time was longer, but the blood loss did not significantly differ from that for the Staff. This indicates an improvement in the technical skill of the B-Resident group, manifested as reduced blood loss without decreased surgical time. Even further improvement was shown by the C-Resident group; even though the resected weight in the surgeries they performed was not different from that in those performed by the Staff, the blood loss for the two groups was similar. While surgical time for the early the C-Resident group (less than 75 ATH) was longer than that for the Staff, that for the late C-residents (75 or more ATH) was not different from that for the Staff. These data suggest that, during the three-year period of the OBGYN residency, performing approximately 75 ATH surgeries is necessary to improve the residents' surgical technique to a proficiency level comparable to that of the Staff.

Regarding VTH, patients with large tumors and severe adhesions are not candidates for VTH. The present data indicated that increased weight was more significantly related to surgical time and blood loss in VTH than in ATH. This a priori exclusion might have influenced tumor weight, as there were no significant differences among the tumor weights for the three groups.

The blood loss for the Resident-1st half group was slightly greater than that for the Staff, while that for the Resident-2nd half group was comparable. The absence of any significant differences among the groups could have been related to the policy of delaying the VTH training until the resident has already performed ten ATH, and, as indicated by the ATH data, has achieved some proficiency as reflected by reduced blood loss. The pattern of progressive reduction in blood loss in VTH may indicate an improvement in surgical technique by the residents.

Comparison of surgical times, however, revealed that surgical time for the Staff was significantly shorter than those for the resident groups. These data suggest that during the residency period of three years the performance of 25 VTH was insufficient for the resident's technique to become comparable to the staff level.

Thus, we conclude that performing more than 75 ATH is adequate to establish proficiency in this type of surgery during the residency period of three years. However, performing 25 VTH is insufficient, since residents require more training

to learn VTH.

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