



## Review article

## Nerve-sparing radical hysterectomy in cervical cancer

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## ABSTRACT

A new technique of extensive surgical intervention, namely nerve sparing radical hysterectomy (NSRH), was introduced as one of the treatment options for early stage cervical cancer patients because cervical cancer patients suffer from postoperative complications following radical hysterectomy procedure. The step of nerve preservation can reduce postoperative complications, such as bladder or sexual dysfunction problems that occur after a traditional radical hysterectomy procedure. The surgical outcomes seem to be favorable and no serious morbidity was noted. However, further study of the nerve sparing technique is necessary to improve this surgical advantage in the future.

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## Introduction

Radical hysterectomy has been beneficial since Ernst Wertheim published the technique in 1911.<sup>1</sup> Meigs improved the effectiveness of the Wertheim radical hysterectomy technique in the 1940s, by combination with a pelvic node dissection procedure.<sup>2</sup> Moreover, five classes of the Piver-Rutledge-Smith extended hysterectomy became the most commonly used classification for this gynecologic oncology operation since 1974.<sup>3</sup> The Type III radical hysterectomy procedure is considered to be one of the treatment options for patients with early stage cervical carcinoma; more than 100 years ago, extensive tissue dissection was necessary. Surgical-related complications always occur; not only intraoperative complications, but also postoperative complications, such as urinary-rectal dysfunction and sexual dysfunction.<sup>4</sup> Furthermore, as reported by Fujii et al,<sup>5</sup> Okabayashi first introduced radical hysterectomy in Japan in 1921, and in 1944 repeatedly published that the nerve preservation method would be advantageous over the traditional radical hysterectomy procedure, in order to reduce the vast operative morbidity and mortality rates. This operative technique seems to have the benefits of a minimally invasive method. Unfortunately, although there are several studies of the nerve sparing technique in the radical hysterectomy procedure, few studies have been

published. This article reviews the value of nerve-sparing radical hysterectomy (NSRH) in cervical cancer studies.

## Anatomical location of radical hysterectomy-related nerves

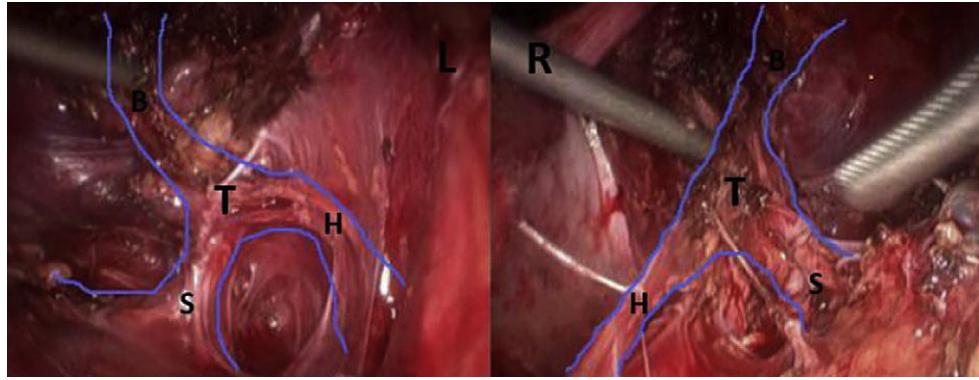
One of the neural tissue networks, the presacral nerve, is the part of the pelvic autonomic nervous system in the presacral space.<sup>6</sup> A retroperitoneal ganglionic midline plexus, which lies on the ventral surface of the lower aorta, is termed the superior hypogastric plexus. These neural tissues split into two trunks of hypogastric nerves, passing the bifurcation of aorta and descending into the pelvis. At the region of internal iliac vessels, the inferior hypogastric plexus (Fig. 1) is developed by nerve fibers of the sympathetic chain from the 10<sup>th</sup> thoracic plexus and parasympathetic fibers from the second, third, and fourth sacral nerves, via the pelvic splanchnic nerve route merged to the hypogastric nerve expansion.<sup>6</sup> In particular, the uterovaginal plexus (Frankenhäuser ganglion; one of three portions of the inferior hypogastric plexus that locates the medial to the uterine blood vessels and the lateral to the uterosacral ligaments) sends neural fibers to innervate the uterus and urinary bladder.<sup>5,6</sup> Extensive tissue resection, including these nerve fibers, was necessary during the radical hysterectomy procedure. Therefore, postoperative complications always occurred.

## Patient characteristics affecting the NSRH procedure

There are many different terms used to describe nerve preservation during the radical hysterectomy procedure, however, they

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**Fig. 1.** Inferior hypogastric plexus. B = bladder branch of inferior hypogastric plexus; H = hypogastric nerve; L = left side; R = right side; S = pelvic splanchnic nerve; T = inferior hypogastric plexus.

have similar meanings with regard to operative characteristics. From the published data of nerve sparing radical hysterectomy, in general, patients' data such as age and clinical FIGO staging are similar (Table 1).<sup>5,7–20</sup> Almost all of the study populations are cervical cancer patients, but other tumors (e.g., vaginal cancer and endometrial cancer) are also included in the NSRH studies.<sup>7,10,12</sup> Surgical interventions of both laparotomy<sup>5,7–17</sup> and laparoscopy<sup>18–20</sup> can be considerable. In a study by Trimbos et al,<sup>8</sup> the nerve sparing operation was performed unsuccessfully in two of 10 patients, because there is greater fatty configuration in western as compared to eastern populations. This is similar to a report by Raspagliesi et al,<sup>9</sup> who experienced a troublesome NSRH procedure in a patient who had a body mass index (BMI) >30 kg/m<sup>2</sup>. Unfortunately, in these two studies, laparotomy was involved. Until now, the correlation of BMI and the laparoscopic method in NSRH studies has not been reported. In addition, Trimbos et al<sup>8</sup> also noted that tumor size is one of the factors that affects achievement in the nerve sparing radical hysterectomy procedure,<sup>11,13,15</sup> but studies do not reveal statistically significant results.

### NSRH procedure affected operation outcome and bladder function

From Table 2,<sup>5,7–16,18–20</sup> it can be seen that most of the published papers demonstrated corresponding outcomes in terms of the mean operating time and blood loss, which revealed non-statistically different results, even though the NSRH procedure in a study by Sakuragi et al<sup>11</sup> was recorded as being >2 hours longer than the non-nerve sparing procedure. Sakuragi et al explained that their hospital is a medical university institute, which may be the reason for this result. Some extensive surgery may lead to a degree of complications during any step of the operation, even if no serious events were identified.<sup>21,22</sup> Furthermore, a short operative time for specimen removal via the vaginal approach in the laparoscopic study<sup>20</sup> was also reported.

Many published studies demonstrated long term urinary dysfunction, which is one of the most common complications in the conventional radical hysterectomy procedure for cervical cancer treatment.<sup>21–25</sup> Thus, NSRH studies attempt to show whether neural

**Table 1**  
General patients' characteristics.

Reference	Age (y)	BMI (kg/m <sup>2</sup> )	Tumor diameter (cm)	Type of tumor (n)	FIGO staging	Number of patients (n)		
						Total	NS	Non-NS
Fujii et al <sup>5</sup>	24–72	21.0 (16.4–28.8)	3.15 (0.75–11.0)	Cervix	IB–IIA	24	24	–
Höckel et al <sup>7</sup>	30–58	–	1.5–5.7	Cervix (6) Vagina (1)	IB–IIB	7	7	–
Trimbos et al <sup>8</sup>	29–69	15–32	2–7	–	IIB	10	8	2
Raspagliesi et al <sup>9</sup>	28–60	17.4–35.2	–	Cervix	IB1–IIB	23	23	–
Ito and Saito <sup>10</sup>	–	–	–	Cervix (23) Endometrium (2)	IB1–IIB IIB	25	25	–
Sakuragi et al <sup>11</sup>	35–60 [NS] 31–64 [non-NS]	–	1.1–7.0 (median 3.9 cm) 1.2–5.0 (median 3.4 cm)	Cervix	IB1–IIB	27	22	5
Charoenkwan et al <sup>12</sup>	28–59	25.06 (17.8–35.2)	2.4	Cervix (21) Endometrium (1)	IB–IIA II [Clinical stage]	22	22	–
Raspagliesi et al <sup>13</sup>	28–76	24.3 (15.8–40.8)	2.44 (22.7–26.1) 2.39 (22.8–25.0) 2.53 (23.6–27.0)	Cervix type II (31) type III-NS (59) type III (20)	IA2–CR if NACT	110	110	–
Kato et al <sup>14</sup>	28–65	22.1 (16.2–34.4)	> 2.0	Cervix UNS/BNS (11/21)	IB–IIB	32	32	–
van den Tillaart et al <sup>15</sup>	23–80 [NS] 25–81 [non-NS]	–	24.8% 18.3% (>4.0 cm)	Cervix	IA–IIA	246	122	124
Höckel et al <sup>16</sup>	24–79	25 (15–40)	3.0 (0.7–10.0)	Cervix	IB–IIB	212	212	–
Höckel <sup>17</sup>	24–77	24 (15–35)	2.7 (0.7–10.0)	Cervix	IB–IIB	163	163	–
Possover et al <sup>18</sup>	–	–	–	Cervix	IB1–IIIA	64	38	28
Querleu et al <sup>19</sup>	–	–	–	Cervix	IA2–II	95	47	48
Possover <sup>20</sup>	–	–	–	Cervix	IB–IIB	32	32	–

BMI = body mass index; BNS = bilateral nerve sparing; CR = complete response; FIGO = International Federation of Gynecology and Obstetrics; n = number of patients; NACT = neoadjuvant chemotherapy; NS = nerve sparing; type II = radical hysterectomy type II; type III = radical hysterectomy type III; type III-NS = nerve sparing radical hysterectomy type III; UNS = unilateral nerve sparing.

**Table 2**  
Intraoperative data.

Reference		Mean operating time (min)	Mean blood loss (mL)	Average duration for bladder drainage (day)	Average length of hospitalization (day)
Fujii et al <sup>5</sup>		—	—	14.64 (±2.04)	—
Höckel et al <sup>7</sup>		—	800 (500–1500)	12 (8–30)	—
Trimbos et al <sup>8</sup>		180–240	510–1700	5–7	9 (8–11)
Raspagliesi et al <sup>9</sup>		219 (150–270)	489 (200–800)	4–28	10 (5–16)
Ito and Saito <sup>10</sup>		—	—	17.1 (±6.4)	—
Sakuragi et al <sup>11</sup>	NS	515 (387–791)	1400 (640–4185)	—	—
	Non-NS	370 (345–648)	1160 (450–2400)	—	—
Charoenkwan et al <sup>12</sup>		220 (180–270)	510 (200–1300)	11.27 (5–26)	—
Raspagliesi et al <sup>13</sup>	type II	175	224	—	7.4 (6.8–8.0)
	type III-NS	210	421	—	9.0 (8.6–9.9)
	type III	224	434	—	9.1 (8.3–10.0)
Kato et al <sup>14</sup>	UNS	343 (272–548)	736 (238–1380)	11.5 (5–21)	—
	BNS	—	—	5.3 (1–14)	—
van den Tillaart et al <sup>15</sup>	NS	174 (60–270)	840 (125–4500)	5 (3–29)	7.0 (5–32)
	Non-NS	192 (120–330)	1115 (175–11000)	—	—
Höckel et al <sup>16</sup>		426 (306–696)	—	9 (6–29)	12 (5–24)
Possover et al <sup>18</sup>	NS	—	—	11.2 (6–20 ± 4.3)	—
	Non-NS	—	—	21.4 (7–47 ± 11.3)	—
Querleu et al <sup>19</sup>	NS *	228	391	1 or 2	—
	Non-NS **	233	272	—	—
Possover <sup>20</sup>		167 (135–195) (+only P&PM LD)	—	—	—
		202 (181–215) (+PA LD)	—	—	—

BNS = bilateral nerve sparing; FIGO = International Federation of Gynecology and Obstetrics; NS = nerve sparing; NS \* = radical hysterectomy with paracervical dissection; Non-NS \*\* = radical hysterectomy without paracervical dissection; PA LD = para-aortic lymphadenectomy; P&PM LD = pelvic and parametric lymphadenectomy; type II = radical hysterectomy type II; type III = radical hysterectomy type III; type III-NS = nerve sparing radical hysterectomy type III; UNS = unilateral nerve sparing.

tissue preservation can resolve these problems or not. Possover et al<sup>18</sup> studied 38 cervical cancer patients undergoing the nerve-sparing laparoscopic-assisted radical vaginal hysterectomy Type III, and 28 patients undergoing the non-nerve sparing operation. They revealed a statistically significant result ( $p = 0.0007$ ) of bladder drainage duration between 11.2 days (6–20, ±4.3) in nerve-sparing and 21.4 days (7–47, ±11.3) in non-nerve sparing groups, even though the urinary retention outcome was discovered in some nerve-sparing patients.<sup>19</sup> Thus, bladder drainage duration in the NSRH procedure was recorded as varying from approximately 1 to 4 weeks<sup>5,7–10,12,14–16,18,19</sup>; individual bladder training policy may be one of the affecting factors. The value of the bilateral nerve-sparing procedure was also significantly demonstrated by Kato et al.<sup>14</sup> The urinary catheter could be removed in patients in whom NSRH was performed bilaterally, within 5.3 days, compared with 11.5 days in the unilateral group ( $p = 0.004$ ). Furthermore, early improvement in bladder function data, in terms of patients who could be discharged without self-catheterization<sup>13,14</sup> was also reported. After the T-shape inferior hypogastric plexus preservation technique was published in 2007, Fujii and colleagues<sup>5</sup> revealed a successful study, not only in terms of bladder function, but also in terms of bladder fullness sensation and satisfactory micturition. The authors reported that 91.7% of patients gained the bladder fullness sensation 5 days after removal of the catheter, and 17 patients (70.8%) had early satisfactory micturition within 14 postoperative days; both functions completely recovered within 3 weeks.

### Operative complications in NSRH

Considering early complications, many nerve-sparing radical hysterectomy studies recorded various complications that seem similar to the conventional methods, as shown in Table 3.<sup>7–9,11–17,19</sup> Most complications are mild and manageable. Raspagliesi and colleagues<sup>13</sup> unveiled a comparative study of complications between Type II, nerve-sparing Type III, and conventional Type III radical hysterectomy. They experienced Grade III/IV ureteral complications data or perioperative complications of 10%, 17%, and 15%, respectively; there was no statistically significant difference

between the groups. The authors concluded that the NSRH procedure is comparable to the Type II radical hysterectomy, however, in terms of early bladder dysfunction, it appears superior to the Type III conventional style. Moreover, after a 1-year follow-up period, Sakuragi et al<sup>11</sup> stated in their study that no incontinence problems developed in 22 of 27 preserved-nerve patients. By contrast, Querleu and colleagues<sup>19</sup> discovered significantly different post-operative urinary retention rates in laparoscopic vaginal radical hysterectomy, with 36% of the preserved nerve compared to 10.4% of the non-preserved nerve procedure; the immediate splanchnic nerve surrounding tissue edema was described to be the reason.

### Pathologic risk factors in the NSRH procedure

The histopathological factors in the NSRH study are outlined in Table 4.<sup>7–9,11–17,19</sup> The average number of removed pelvic nodes was about 30–70; the peri-aortic node count are also mentioned. Lymph node metastasis, lymphovascular space invasion (LVSI), and parametrial invasion were 5–26%, 40–50%, and 10–20%, respectively. Raspagliesi et al<sup>13</sup> and van den Tillaart et al<sup>15</sup> demonstrated the resemblance of risk factors in cervical cancer patients who underwent NSRH and non-NSRH. No significant differences were noted.<sup>26,27</sup>

### Recurrence status and survival rate in the NSRH procedure

Concerning the relationship between prognostic factors and survival, several published studies reported that the risk factors of cervical cancer were related to the recurrent status and survival rate for patients with cervical carcinoma who were treated by standard management,<sup>28–30</sup> such as adenocarcinoma histological type, tumor size, lymphovascular invasion, lymph node metastasis, and parametrial involvement. The NSRH study also disclosed these outcomes. Unfortunately, the preservative nerve technique including laparotomy and laparoscopy is a new strategy, from the past 10 years, and not much survival outcome information has been reported. The details are shown in Table 5.<sup>11,15–17,19</sup> The recurrent disease occurred at local-regional and/or distant metastasis, but not

**Table 3**

Complications data.

Reference		Intraoperative complications (n or %)	Postoperative complications (n or %)			Late complications		
Höckel et al <sup>7</sup>		0	—	—	—	—	—	—
Trimbos et al <sup>8</sup>		—	5	—	—	—	—	—
Raspagliesi et al <sup>9</sup>		0	6	—	—	—	—	—
Sakuragi et al <sup>11</sup>	NS	—	—	—	—	1 y post surgery	0	—
	Non-NS	—	—	—	—	3 (urinary incontinence)	3 (reduced desire to void, abnormal bladder sensation)	—
Charoenkwan et al <sup>12</sup>		1	—	—	—	—	—	—
Raspagliesi et al <sup>13</sup>	type II	Grade III/IV complication	Minor grade:	Major grade	—	Grade III/IV ureteral complications and ureteral fistula rate: 5.4% and 3.6%		
	type III-NS	3 (10%)	6	3	—			
	type III	10 (17%) 3 (15%)	10 4	11 3	—			
Kato et al <sup>14</sup>	UNS	—	3	—	—	—	—	—
	BNS	—	6	—	—	—	—	—
van den Tillaart et al <sup>15</sup>	NS	—	7.5% (UTI), 6.7% (fever), 2.5% (RTI)	—	—	—	—	—
	Non-NS	—	—	—	—	—	—	—
Höckel et al <sup>16</sup>		—	132 (62%) (no complication) 74 (35%) (grade 1) 20 (9%) (grade 2) 74 (minor grade)	—	—	—	—	—
Höckel <sup>17</sup>		—	—	—	—	—	—	—
Querleu et al <sup>19</sup>	NS*	—	Post-op comp	U retention (>100 mL)	Duration (days)	No U sympt	≥1 mod or sev sympt	Sev sympt
	Non-NS**	—	7	17 (36%)	16 (1–330)	4/32 (12.5%)	15/32 (47%)	6/32 (19%)
			4	5 (10.4%)	11 (3–21)	4/28 (14%)	13/28 (46%)	5/28 (18%)

BNS = bilateral nerve sparing; FIGO = International Federation of Gynecology and Obstetrics; mod = moderate; n = number of patients; Non-NS \*\* = radical hysterectomy without paracervical dissection; NS = nerve sparing; NS\* = radical hysterectomy with paracervical dissection; P&PM LD = pelvic and parametric lymphadenectomy; post-op comp = postoperative complication; RTI = respiratory tract infection; sev = severe; sympt = symptoms; type II = radical hysterectomy type II; type III = radical hysterectomy type III; type III-NS = nerve sparing radical hysterectomy type III; U = urinary; UNS = unilateral nerve sparing; UTI = urinary tract infection.

with a high incidence. After 2–5 years follow up 80–100% of disease free survival and overall survival data were not revealed to be lower than for conventional radical surgery.<sup>28,29</sup> In a comparative study, the authors showed a 2-year disease free survival rate of 95.5% in the preserved nerve group, compared to 100% in the non-nerve sparing group<sup>11</sup>; there was no statistical difference in the 5-year overall survival rate between the two groups.<sup>15</sup> In addition, Höckel and colleagues<sup>16,17</sup> studied the total mesometrial resection

(TMMR) technique, which is the removal of the embryologically uterovaginal (Müllerian) compartment. They demonstrated satisfactory 3-year and 5-year survival outcomes, which were related to histopathological factors. Höckel and colleagues explained that this new operative technique could be the reason for the favorable results. When the recurrent disease location was considered, the authors showed that this technique can explore the rich lymph nodes areas, which traditional radical hysterectomy can not.<sup>16</sup>

**Table 4**

Pathologic risk factors.

Reference		Number of lymph nodes	LN metastasis, n (%)	LVSI, n (%)	Parametrial invasion, n (%)
Höckel et al <sup>7</sup>		33–76	1	—	—
Trimbos et al <sup>8</sup>		—	2	—	1
Raspagliesi et al <sup>9</sup>		43 (18–69)	5/23 (22%)	11/23 (48%)	3
Sakuragi et al <sup>11</sup>	NS	—	4/22	17/22	—
	Non-NS	—	0/5	3/5	—
Charoenkwan et al <sup>12</sup>		27 (16–42)	1 (5%)	6 (27%)	3 (14%)
Raspagliesi et al <sup>13</sup>	type II	—	—	16 (51.6%)	3/31 (10%)
	type III-NS	—	—	26 (44%)	13/59 (22%)
	type III	—	—	10 (50%)	4/20 (20%)
Kato et al <sup>14</sup>	UNS	—	14/32 (total)	20/32 (total)	9/11
	BNS	—	—	—	—
van den Tillaart et al <sup>15</sup>	NS	22 (6–45)	26.2%	37.7%	7.4%
	Non-NS	17 (5–33)	16.9%	34.9%	7.3%
Höckel et al <sup>16</sup>		44 (15–104) (PL) 10 (4–31) (PA)	44 (PL) 12 (PA)	136 (lymphatic) 22 (vascular)	52 (25%) (subperitoneal mesometrium) 29 (14%) (uterine corpus) 12 (6%) (proximal vagina) 2 (fallopian tubes) 1 (middle vagina)
Höckel <sup>17</sup>		46 (±12) (PL) 11 (±7) (PA)	32 (20%) (PL) 7 (4%) (PA)	98 (lymphatic) 14 (vascular)	—
Querleu et al <sup>19</sup>	NS*	19 (6–46)/6 (0–18) (IL/PM)	4/1 (IL/PC)	11	2
	Non-NS**	18 (4–45)/0 (IL/PM)	2/0 (IL/PC)	13	1

BNS = bilateral nerve sparing; FIGO = International Federation of Gynecology and Obstetrics; IL = interiliac node; LN = lymph node; LVSI = lymphovascular space invasion; n = number of patients; NS = nerve sparing; NS\* = radical hysterectomy with paracervical dissection; Non-NS\*\* = radical hysterectomy without paracervical dissection; PA = para-aortic lymph node; PC = paracervical node; PL = pelvic lymph node; PM = parametrial node; type II = radical hysterectomy type II; type III = radical hysterectomy type III; type III-NS = nerve sparing radical hysterectomy type III; UNS = unilateral nerve sparing.



**Table 5**  
Recurrence and survival data.

Reference		Follow-up period (mo)	Patients with recurrence, n (%)	Mean time to recurrence (mo)	Mean local recurrence-free survival (mo)	Mean disease-free survival (mo)	Cumulative disease-free survival rate
Sakuragi et al <sup>11</sup>	NS Non-NS	29 (12–48)	1/22 —	—	—	13–48 12–36	At 2 y 95.5% 100%
van den Tillaart et al <sup>15</sup>	NS Non-NS	24	8.3% 4.9%	13.3 11.7	11.6 11.9	22.0 22.7	2-y LFS and 5-y OS
Höckel et al <sup>16</sup>		41 (5–110)	3 (1.4%) (pelvis only) 2 (1.1%) (pelvic & distant) 5 (2.4%) (distant only)	—	—	—	5-y DFS 5-y OS 94% 96% (whole patients) 98% 98% (stage IB–IIA; n = 159) 81% 91% (node positive; n = 44)
Höckel <sup>17</sup>		45 (3–104)	4/163 (local recurrence) 2/163 (locoregional-distant) 4/163 (distant metastases)	—	—	—	3-y RFS 3-y DSF 93% 96% (whole group) 98% 100% (low-risk group; n = 68) 90% 95% (high-risk group; n = 95)
Querleu et al <sup>19</sup>	NS* Non-NS**	26 (2–51) 41 (1–118)	3 4	—	—	—	—

DFS = disease-free survival; DSF = disease-specific overall survival; LFS = local recurrence-free survival; n = number of patients; NS = nerve sparing; NS\* = radical hysterectomy with paracervical dissection; Non-NS\*\* = radical hysterectomy without paracervical dissection; OS = overall survival; RFS = recurrence-free survival.

### Sexual function after NSRH procedure

Sexual dysfunction complications (such as dyspareunia, vaginal lubricant deficiency, insensibility of labial areas, discomfort or dissatisfaction during sexual intercourse, etc) have been described.<sup>31–33</sup> Rees and associates reported that the radical pelvic operation produced a degree of damage to the autonomic nerve innervation of the blood vessels of the vaginal wall, which could be related to the postoperative sexual function abnormality.<sup>33</sup> Pieterse et al<sup>34</sup> analyzed the effect of the NSRH procedure on postsurgical vaginal blood flow, using photoplethysmographic assessment of the vaginal pulse amplitude (VPA). Cervical cancer patients, who were treated with the traditional radical hysterectomy, had a statistically significant lower mean VPA than premenopausal women and those in the nerve sparing group. In addition, the study confirmed that pre- and postmenopausal women, with a history of conventional radical hysterectomy, had a lower VPA outcome, similar to that in the normal healthy postmenopausal control group. Pieterse et al concluded that the conventional radical surgery procedure produced a lower vaginal blood flow pattern, similar to the postmenopausal population. The nerve sparing method can preserve the autonomic neural tissue, so the vaginal innervation related to sexual function can be protected. Ditto et al used quality of life (QoL) scores, with the function assessment of cancer therapy-cervix (FACT-Cx) questionnaire, to evaluate organ function and quality of life in cervical cancer patients who underwent Type II and Type III NSRH.<sup>35</sup> The assessment of physical, functional, emotional, and social well-being did not demonstrate significant differences, but radiotherapy seemed to be more effective than the surgical technique.

### Conclusion

The NSRH procedure is a valuable method for reducing treatment-related morbidity of extensive surgical procedures. It has been reported that cancerous tissue can be removed to the same degree as with the conventional radical hysterectomy method. Also, the pelvic autonomic nervous tissue can be conserved, which reduces long term complications. In institutes with advanced surgical skill facilities, laparoscopic surgery is one of the minimally invasive operative procedures that can be beneficial for cervical cancer patients; it depends on the patient's factors and physician's experiences. However, the surgical advantage of NSRH

for improving the treatment quality in patients with cervical cancer, such as in terms of prognostic factors or bulky tumor status, should be further studied.

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