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Early muscular remodeling in patient with thyroid cancer after transaxillary robot-assisted surgery

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Purpose

- ***Why Robot Surgery?*** Robotic surgery in patients with thyroid cancer has the advantage of not leaving scars after surgery on the neck and excellent in preserving the parathyroid gland and nerves through robot-assisted microsurgery, so it is particularly preferred by younger patients.
- ***Problem*** During robotic surgery, an incision is required in the axillary region, and the dermis layer and muscle layer of the pectoralis must be separated and retracted during the 1-2 hour of operation time. Therefore, the mechanical damage of the dermis and muscular layers is inevitable, and it leads to postoperative pain and reduced range of motion (ROM) of the ipsilateral shoulder joint.
- ***Limitation in Current Management*** To make early functional recovery, ice bag applies and stretching exercise has been suggested. However, patients are not easy to stretch their shoulder and pectoral muscles because of severe postoperative pain.
- ***Purpose*** Thus, this study suggests of giving the education and physical therapy to the patients earlier in acute phase.

Material and Methods

- ***Study design***
  - A pilot study
  - Single tertiary hospital (Gangnam Severance Hospital)
  - Participant recruitment: 1 month (February 2023)
- ***Participants***
  1) Inclusion criteria: patients diagnosed with thyroid cancer underwent robotic surgery and referred for early rehabilitation
  2) Exclusion criteria: who did not receive the rehabilitation program
- ***Intervention***
  - POD 0: education of the patient and caregiver by a physiatrist
  - POD 1: physical therapy and education by a physical therapist
- ***Primary and secondary outcomes***
  1) **The pain score (numeric rating scale, NRS)**
  2) **Functional**
     - Shoulder range of motion: flexion and abduction
     - Functional performance: head-up-tilt, supine-to-sit

Table 2. Early rehabilitation program after robot-assisted thyroidectomy

Service day	Program	Service provider
POD0	**I. Patient and caregiver education** 1. Body perception: pain and function 2. Importance and method of ice bag apply 3. Desensitization technique applying on the peri-surgical site 4. Gentle stretching of the ipsilateral shoulder joint 5. Gentle massage of the bilateral sternocleidomastoid muscle	Physiatrist
POD1	**II. Physical therapy and education** 1. Breathing exercise and core setting 2. Cryotherapy using a vapocoolant spray on the pectoral and anterolateral neck area 3. Deep neck muscle activation 4. Passive range of motion exercise of the neck 5. Education of neck muscle stretching exercise 6. Mobilization of the pectoral muscle layers 7. Passive range of motion exercise of the shoulder joint 8. Education of shoulder joint stretching exercise	Physical therapist

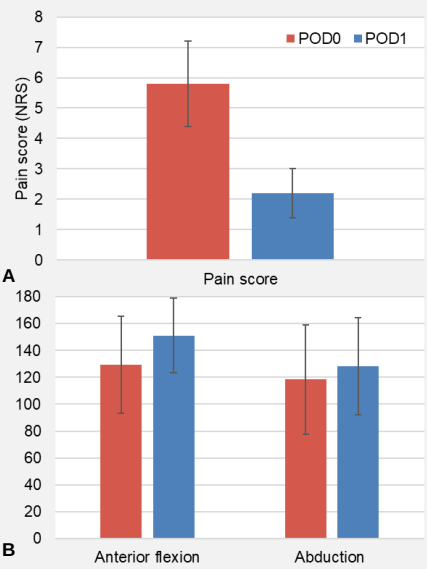
Results

Table 1. Baseline characteristics

Variables	N = 17
I. Demographic characteristics	
Sex, n (%)	
Male	2(11.8)
Female	15(88.2)
Age, yr, mean (range)	37.1(17~50)
II. Cancer related characteristics	
Topography: lesion side, n (%)	
Right	12(70.6)
Left	3(17.6)
Bilateral	2(11.8)
Surgical method, n (%)	
Total thyroidectomy with CCND	16(94.1)
Hemithyroidectomy with CCND	1(5.9)
Pathology, n (%)	
Pathologic diagnosis	
Papillary microcarcinoma	15(88.2)
Papillary carcinoma	1(5.9)
Follicular adenoma	1(5.9)
Associated benign lesion	
Lymphocytic thyroiditis	3(17.6)
Adenomatous hyperplasia	2(11.8)
Follicular adenoma	1(5.9)
Psammomatous calcification	6(35.3)
Lymphovascular invasion	8(47.1)
Lymph node invasion	7(41.2)
Genetic mutation, n (%)	
BRAF	9(52.9)
TERT	0(0.0)
III. Postoperative characteristics on POD0	
Pain score, numeric rating scale, mean (SD)	5.9(1.4)
Shoulder range of motion, degree, mean (SD)	
Anterior flexion	129.4(36.2)
Abduction	118.4(40.7)
Functional performance, n (%)	
Head-up-tilt	
Intact	7(41.2)
Impaired	10(58.8)
Supine-to-sit	
Independent	7(41.2)
With assist	10(58.8)

BRAF, B-Raf proto-oncogene serine/threonine-protein kinase; CCND, central compartment neck dissection; POD, postoperative day; SD, standard deviation; TERT, telomerase reverse transcriptase.

Figure 1. Pain score and shoulder range of motion



- A total 17 patients were enrolled in the early rehabilitation program.
- The baseline characteristics of the patients in POD1 is listed in Table 1.
- The pain score [mean (SD)] was reduced from 5.9 (1.4) to 2.2 (0.8) ($P < 0.001$) (Fig. 1A).
- The ROM of shoulder anterior flexion was significantly increased from 129.4 (36.2) to 151.2 (28.0) degree ($P < 0.001$), and that of the abduction had a tendency of increment, but no statistical significance ($P = 0.105$), from 118.4 (40.7) to 128.2 (36.1) degree (Fig. 1B).
- Head-up-tilt became possible in all 17 patients in POD1.

Conclusion

The early education and rehabilitation after robot-assisted thyroidectomy in thyroid cancer patients seems to effective in relieving the postoperative pain and regaining the mobility. Further randomized controlled study controlled by analgesic use should follow to prove the actual effectiveness of this early rehabilitation service.