

Peer Review File

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Reviewer A

I think this manuscript is a well-written one with an adequate number of cases, but there seem to be several points that should be clarified or corrected before consideration of acceptance.

1. In prospective or retrospective way did you collect the data? How were the robotic group and open group divided? Were they selected or consecutively collected? Please describe them in detail in '2.1 Case selection' part.

Reply: This was a retrospective study. All patients were informed of the advantages and disadvantages of robotic surgery and open surgery, and made their own decisions before operation. According to the inclusion and exclusion criteria, we consecutively included 217 cases that met the criteria from 2017 to 2018. (P6, L74-78)

2. Surgeon factor is the major determinant of the surgical results. The fact that two different surgeons performed two different types of surgery, respectively is a crucial defect of this study. Changing the study design or describing it as a limitation is needed.

Reply: As you said, surgeon factor is the major determinant of the surgical results. But the learning curve for robotic thyroid surgery requires more than 50 cases. To avoid the influence of the surgeon's proficiency on surgical outcomes, we enrolled the patients treated by the most experienced surgeon in the robotic surgery group and in the open surgery group, respectively. Actually, even if we compare results of robotic surgery and open surgery performed by the same surgeon, the selection bias is still inevitable because he or she may show better skills in robotic or open surgery. We already described it as a limitation in the last two paragraphs. (P17, L278-281)

3. Preop. and postop. vocal core exam is more accurate way to evaluate the vocal cord function than voice observation.

Reply: The laryngoscopy of the vocal cord is more accurate to evaluate the function

of the recurrent laryngeal nerve. However, most patients with normal postoperative pronunciation refuse to do it because of discomfort during this procedure. We had to evaluate the vocal cord activity by voice changes (hoarseness of voice) instead of laryngoscopy, which is a limitation in the study design. (P17, L281-283)

4. According to previous studies on robotic thyroid surgery, younger and female patients tend to choose robotic surgery. Please explain the result was different in your study.

Reply: It is believed that there is no significant difference in efficacy between robotic thyroid surgery and open surgery. The robotic thyroid surgery can better preserve neck appearance, so young patients and female patients tend to choose robotic surgery. In our study, we performed super-meticulous capsular dissection to protect parathyroid function in robotic thyroid surgery, superior to open surgery in reducing the incidence of complications. Considering this, patients were more prone to robotic surgery. There was no significant difference in patient age and gender between robotic surgery and open surgery group. (P16-17, L253-262)

5. Please give more detailed information on how and when the patient satisfaction was evaluated. I think long-term result can reflect the patient satisfaction more correctly than short-term result.

Reply: The survey on patient satisfaction with neck appearance was conducted six months after surgery based on the method in Ji et al's study (Ji YB, Song CM, Bang HS, Lee SH, Park YS, Tae K. Long-term cosmetic outcomes after robotic/endoscopic thyroidectomy by a gasless unilateral axillo-breast or axillary approach. *J Laparoendosc Adv Surg Tech A*. 2014 Apr;24(4):248-53. doi: 10.1089/lap.2013.0459. PMID: 2468425). (P11, L159-160)

6. Postop. thyroglobulin levels and hypoparathyroidism is thought to be evaluated only in total thyroidectomy patients. Different case numbers should be applied in table 4.

Reply: Thanks. We have revised the paper accordingly. (table 4)

Reviewer B

1. You abbreviated your procedure as UABA (unilateral axilla bilateral areola approach). However, UABA is already well known, traditionally meaning unilateral axillo-breast approach. (Lee MC et al, Head Neck. 2013 Apr;35(4):471-6.,, Park KN et al, Surg Endosc. 2016 Sep;30(9):3797-801.) Considering previously known UABA only covers 'unilateral axilla and unilateral areolar' area, your abbreviation seems confusing.

Reply: The abbreviation of UABA approach used in this article is easy to confuse with the previous unilateral axillary breast approach (UABA), so we gave the full definition as unilateral axilla-bilateral areola approach where the abbreviation "UABA" firstly appeared in the manuscript. This abbreviation is precise and based on the rules, and we cannot find a better one. Our previous study also used this abbreviation and has been published (Liu P, Zhang Y, Qi X, et al. Unilateral Axilla-Bilateral Areola Approach for Thyroidectomy by da Vinci Robot: 500 Cases Treated by the Same Surgeon. J Cancer 2019; 16: 3851-9) .

2. Main advantage you advocated is low rate of hypothyroidism. However, metaanalysis showed that hypoparathyroidism risk was no different between open and robotic thyroidectomy (doi.org/10.1007/s00432-020-03418-0). How would you defend this conflicting result? Generally more thermal damage is anticipated during robot surgery, due to complete dependence on energy device.

Reply: Previous studies showed that hypoparathyroidism risk was no different between open and robotic thyroidectomy, but according to our research, the incidence of hypoparathyroidism was significantly lower in robotic surgery than in open surgery. This may be due to the super-meticulous capsule dissection in our robotic surgery, i.e., we preserved the true capsule behind the thyroid and the vascular network attached to its surface, which is conducive to protect the parathyroid gland and its blood supply. It is a pity that this technology has not yet been used in open surgery, so true capsule of the thyroid gland is removed in open surgery, causing much damage to blood supply of parathyroid gland. As for thermal damage caused by energy instruments in robotic surgery, an ultrafine-tipped cautery (the diameter of cautery head was decreased from 1.2 mm to 0.6 mm) was used in our study to achieve super-meticulous dissection and reduce the scope and extent of thermal damage to surrounding tissues during operation.

3. What was your definition of hypoparathyroidism? Detailed description is needed.

Reply: Thank you. The definition of hypoparathyroidism is based on the Reference (W. W. Kim, J. S. Kim, S. M. Hur et al., “Is robotic surgery superior to endoscopic and open surgeries in thyroid cancer?” *World Journal of Surgery*, vol. 35, no. 4, pp. 779–784, 2011), which has already been indicated in the manuscript. (P9-10, L135-140)

4. What is the location and size of the initial incision? Describe.

Reply: A detailed description of the initial incision has been added to the manuscript, as well as the reference. (P8, L106-110)

5. As you described, it seems to be first to compare UABA robot with open surgery. However, there have been several comparisons between endoscopy vs open (Park KN et al, *Surg Endosc.* 2016 Sep;30(9):3797-801.) and several other remote access techniques. These should be well reviewed and discussed.

Reply: UABA in this study is not the same as UABA in other literature. Our UABA refers to unilateral axilla-bilateral areola approach for thyroid surgery with the assistance of Da Vinci robot, the UABA mentioned by the reviewer refers to unilateral axillobreast approach, which means that the surgery is performed through unilateral axilla and unilateral breast. Both the surgical approaches and the devices are different. Our approach shows a better efficacy and lower complication rates compared with open surgery.

6. You included lobectomy during hypoparathyroidism comparison. And bilateral CND rate is definitely higher in open group. Your comparison seems not fair enough.

Reply: Thanks for your suggestion. We have re-analyzed the data according to the scope of surgery. Since the number or proportion of patients receiving total thyroidectomy + central node dissection showed no significant difference between the open surgery group and robotic surgery group, and hypoparathyroidism rarely occurs in patients receiving unilateral lobectomy + unilateral central node dissection, we only compared the incidence of hypoparathyroidism after total thyroidectomy + unilateral or bilateral central area dissection and found a significant difference between the two

groups. (P12, L175-181)

Reviewer C

The authors present the technique of the unilateral Axilla-bilateral Areolar (UABA) approach for thyroidectomy through the use of the da Vinci S robot in patients with thyroid carcinoma. They have retrospectively reviewed and compared the early surgical outcomes of this technique with conventional open thyroidectomy in a single institution.

Overall, they saw that the robotic UABA group had longer operative times. Patient cosmetic satisfaction was at a higher level in the robotic UABA group. The complication rate in terms of transient and permanent hypoparathyroidism was lower in the robotic UABA group. The number of retrieval lymph nodes and the postoperative thyroglobulin levels were similar between the two groups. They concluded that robotic UABA is able to attain better cosmetic satisfaction and lower hypoparathyroidism rates while achieving the same surgical completeness in thyroid cancer patients.

My comments are as follows:

- Overall

1. To improve the readability to worldwide readers, we advise English language editing for the manuscript.

Reply: Thanks, English language editing has been done.

- Introduction:

1. The author states “compare with other malignancies, most thyroid cancer patients have a good prognosis, so they demand not only the radical removal of lesions but also better quality of life after surgery” and refers this statement to reference 3 and reference 4. However, we cannot locate the relation of the reference to this statement. Supporting this statement with references focusing on “good prognosis” or “quality of life” might be more suitable.

Reply: Thank you. We replace reference 3 and reference 4 with more reliable references.

2. The author states “the da Vinci robot is more conducive to meticulous operation compared with conventional open surgery”. But there is no reference provided to support this statement.

Reply: Thank you. We have added suitable references. (P5, L53)

- Materials and Methods:

2. How many surgeons perform the surgeries needs to be more clearly described. Is there one surgeon performing robotic UABA and another surgeon performing the open thyroidectomy? Are we comparing results from one surgeon to another? How do we minimize the bias?

Reply: In our study, one surgeon performed robotic UABA and another surgeon performed the open thyroidectomy, each with experiences in more than 1000 cases of thyroidectomy. And each of them was the most experienced surgeon of our center in the robotic surgery group and in the open surgery group, respectively. Actually, even if we compare results of robotic surgery and open surgery performed by the same surgeon, the selection bias is still inevitable because he or she may show better skills in robotic or open surgery. We already described it as a limitation in the last two paragraphs. (P17, L278-281)

2. Is the technique of “Super-meticulous capsular dissection (SMCD)” only performed in the robotic group or both groups? If the technique is only performed in the robotic group, does the author think open thyroidectomy precludes the adoption of this technique?

Reply: Thank you. The super-meticulous capsule dissection is achieved by high-definition 3D field of view magnified more than 10 times by the Da Vinci robotic surgery system and modified surgical instruments, but it is hard to achieve in open surgery.

3. We advise the author to provide more information (picture or product information) about the “special thyroid retractor” and “ultrafine-tipped cautery in robotic surgery”.

Reply: Thank you. The detailed description is available in our published article ([Liu P, Zhang Y, Qi X, Liu H, Du J, Liu J, Liu J, Fu W, Zhang Y, Jiang J, Fan L. Unilateral Axilla-Bilateral Areola Approach for Thyroidectomy by da Vinci Robot: 500 Cases](#))

Treated by the Same Surgeon. J Cancer 2019; 10(16):3851-3859.)

4. The definition of complications such as hypocalcemia, transient and permanent hypoparathyroidism, transient and permanent hoarseness of voice, and postoperative hemorrhage, need to be described in a clearer way.

Reply: Thank you. We have given clear definitions of the above-mentioned complications according to the literature (W. W. Kim, J. S. Kim, S. M. Hur et al., “Is robotic surgery superior to endoscopic and open surgeries in thyroid cancer?” World Journal of Surgery, vol. 35, no. 4, pp. 779 - 784, 2011)

5. How is the surgical method (lobectomy versus bilateral total thyroidectomy, with versus without lymph node dissection, unilateral or bilateral lymph node dissection) chosen?

Reply: Thank you. The scope of surgery was determined according to the 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. According to the guidelines, unilateral lobectomy is used for patients with unilateral microcarcinoma and no contralateral lesions; total thyroidectomy for bilateral carcinomas or tumor lesions ≥ 1 cm or lesions infiltrating the capsule; bilateral central node dissection was used for bilateral carcinomas or suspected central node metastasis by preoperative examination or tumor diameter ≥ 3 mm, otherwise prophylactic unilateral lymph node dissection was routinely adopted.

- Results

1. In the manuscript, the author states that the tumor location was shown in Table 1. But we do not find this information in Table 1.

Reply: Thank you. The data on the tumor location has been added. (Table 1)

2. What is the method used by the author to measure the patient's satisfaction with neck appearance?

Reply: The method to measure patient's satisfaction with neck appearance is based on reference (Ji YB, Song CM, Bang HS, Lee SH, Park YS, Tae K. Long-term cosmetic outcomes after robotic/endoscopic thyroidectomy by a gasless unilateral axillo-breast or axillary approach. J Laparoendosc Adv Surg Tech A. 2014

Apr;24(4):248-53. doi: 10.1089/lap.2013.0459. PMID: 24684254.)(P11, L159-160)

3. The result of the patient's satisfaction with the appearance of their neck should not be under section 3.2: number of dissected lymph nodes and operation time. The satisfaction of neck appearance is not relevant to dissected lymph nodes and operation time. It should be shown in separate section.

Reply: Thank you. We have revised the related passages.

4. Is the level of thyroglobulin measured before or after RAI treatment? How many patients underwent RAI treatment? Is the level of thyroglobulin stimulated or suppressed?

Reply: Thank you. The postoperative thyroglobulin level was determined at the sixth month after the operation. The level of thyroglobulin was suppressed. According to the 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer, a total of 85 patients in this study received RAI treatment, 41 in open surgery group and 44 in robotic surgery group. (Table 1)

5. The statement "the incidence of transient hypothyroidism was 27.8%" should be corrected to "the incidence of transient hypoparathyroidism."

Reply: Thank you. We have revised the related passages.