Peer Review File

Reviewer A

The Authors conducted a very interesting study in order to determine the competencies required for successful performance of robotic thyroidectomy. The results of this study may represent a hint for the development of a standardized training program. Overall, the paper is well written and discussion is well articulated according to results. Tables and figures are representative and satisfy quality. English is appropriate.

Response: We are deeply grateful to the reviewer for acknowledging the significance of our research and providing the constructive comments in detail.

1. Page 6, line 134. Robotic Thyroidectomy is not a minimally invasive technique but a remote-access technique. Indeed, either robotic- BABA, RATT and robotic-TOETVA are maximally invasive and their primary purpose is to avoid a neck scar.

Response: To address a reviewer's suggestion, the description of robotic thyroidectomy changed in the revised manuscript.

Highlight, page 4, line 51.

"Robot thyroidectomy (RT) is remote-access surgery and results in higher cosmetic satisfaction than conventional thyroidectomy (CT)."

Introduction, page 6, line 113.

"Robot thyroidectomy (RT) is remote-access surgery and results in higher cosmetic satisfaction than conventional surgical methods (10)."

2. It would be better if Authors mention the problem of unconventional complications and hot to face them (please see: Rossi L, Buoni V, Fregoli L, Papini P, De Palma A, Materazzi G. Postsurgical complications after robot-assisted transaxillary thyroidectomy: critical analysis of a large cohort of European patients. Updates Surg. 2022 Apr;74(2):511-517. doi: 10.1007/s13304-022-01244-2. Epub 2022 Mar 3. PMID: 35239151; PMCID: PMC8995261.). Indeed, remote-access techniques are burdened by the risk of access-related complications, although very rare. These are complications that cannot occur during open thyroidectomy, and surgeons must be aware of them and know how to prevent and treat them. I suggest the authors to mention this issue at least among the limitations of the paper.

Response: We appreciate the reviewer's helpful and constructive comments. To address a reviewer's suggestion, the description of access-related complication added in the revised manuscript.

Discussion, page 13, line 266.

"Surgeons should be mindful that, despite their proficiency in the surgical skills we provide, complications may arise in rare cases. A recent analysis of a large-scale robotic surgery study revealed rare complications in 60 out of 5,011 patients. These rare complications comprised hematoma in 4 cases (0.44%), chyle leakage in 15 cases (0.3%), flap injury in 4 cases (0.08%), recurrent laryngeal nerve injury in 7 cases (0.14%), open conversion in 8 cases (0.16%), and pneumothorax in 4 cases (0.08%) (27)."

27. Kwak J, Yu HW, Ahn JH, Kim SJ, Chai YJ, Choi JY, et al. A Time Trend Analysis of 5,000 Robotic Thyroidectomies via Bilateral Axillo-Breast Approach. World J Surg. 2023 Feb;47(2):403-11.

Reviewer B

The aim of this study was to assess the importance of expert performance and cognitive strategies required for BABA robotic thyroidectomy (RT), and the authors identified 64 crucial items within six modules related to RT.

Despite these significant findings, some serious biases need to be addressed:
1. RT requires advanced surgical skills compared to open thyroidectomy. However, the authors defined Subject Matter Experts (SMEs) as individuals who had completed 40 or more BABA RT operations, defined as the cut-off point for the learning curve. Generally, surpassing the learning curve implies that an individual has attained a basic understanding of a specific skill or knowledge. This, however, does not necessarily indicate that they have achieved expert status, particularly in fields like RT that demand advanced skills.

Response: The BABA-RT procedures were a relatively novel approach at the time of the study. However, we aimed to establish a conservative definition of SMEs, given the highly educational purpose of this study. Previous studies published before ours indicated that the learning curve of BABA-RT for novice surgeons was approximately 40 cases (1–3), and this learning curve is also consistent with a systematic review published in 2023 (4). Consequently, we defined SMEs as surgeons who had completed 40 or more BABA-RT operations and possessed over 5 years of clinical experience. We included this additional criterion and references in the manuscript to clarify our definition of SMEs at the time of the study.

Methods, page 7, line 128-130.

"We defined subject matter experts (SMEs) as individuals who had conducted 40 or

more BABA RT operations (11–14). Moreover, we included individuals with a minimum of 5 years of clinical experience to guarantee proficiency in BABA-RT."

2. To broaden the qualitative data's scope, it is advisable to select SMEs that represent a diverse demographic and geographic distribution in order to capture as many practices as possible.

Response: The BABA-RT procedure was a relatively novel approach at the time of the study. The BABA-RT for thyroidectomy was pioneered in Korea in 2008. During the current study in 2019, we encountered a challenge in identifying expert thyroid surgeons from other countries who had performed 40 or more cases of BABA-RT and possessed at least 5 years of clinical experience. Therefore, only a few surgeons in South Korea have met the pre-defined criteria of Subject Matter Experts (SMEs). We note that the restricted demographic and geographic distribution of participants could be a limitation of these findings.

Discussion, page 13, line 255-259.

"Another consideration is that our study is demographically homogeneous. Since BABA RT is a surgical method that originated in Korea, this initial Delphi study had to focus on expert surgeons in Korea. However, presently, the same surgery is being conducted on individuals of different races in various countries worldwide. With the insights gained from this study, it will be possible to develop surgical guidelines from a global perspective in the future."

3. The process of selecting the 21 participants for the modified Delphi survey was not clearly detailed, and it even included those recruited for the Cognitive Task Analysis (CTA). It is recommended that high-volume surgeons from various geographic locations, separate from the SMEs, should be considered.

Response: In response to a reviewer's suggestion, we revised the sentence to clarify the process of recruitment as below.

Methods, page 7, line 130-132.

"We used convenience sampling to enlist twelve SMEs for the qualitative cognitive task analysis (CTA) via email. Additionally, we recruited 21 surgeons through email for the modified Delphi survey."