



Role of Joll's Triangle, Beahr's Triangle, Area of Concern and A proposed "Unified Area of Danger" for Safe Thyroidectomy

Authors

Sharma Shweta^{1*}, Rout Tapas Kumar², Patro Sithun Kumar³

*Corresponding Author

Sharma Shweta

Abstract

Introduction: Surgeons take in to consideration various triangles so as to ensure safe thyroidectomy with precision and minimal morbidity. These triangles and area of concern have their own advantages and disadvantages over each other. In order to have a inclusive and conclusive approach, mitigating maximum risk factors of thyroidectomy, a proposed Unified Area of Danger (UAD) provide ease and comfort to the surgeon for safe thyroidectomy. A study was carried out to assess the usefulness of the triangles described in relation to thyroidectomy.

Material and Method: It was observational study and data collected from Endocrine/ General/Onco-Surgeons/ENT surgeons. A Questionnaire was designed, which included 8 statement questions, to verify the awareness about the triangles and their utility amongst the surgeons and also the ease of understanding unified area of danger and its usefulness. Out of 80responses, responses by 65 surgeons were included in the study.

Results: Although 63 surgeons were aware of Jolls triangle and Beahrs triangle only 34 surgeons had utilised them which is 52.30%.

Out of 62 surgeons who were aware of triangle of Concern only 35 had utilised it to protect RLN and to prevent bleeding which is 53.80%.

In UAD the inferior Parathyroid glands and superior parathyroid glands were found in 67.70% and 90.80% of cases respectively and recurrent laryngeal nerve in 95.40% of cases. External branch of Superior laryngeal nerve is not found in this area.

Discussions: Surgeons are aware about the triangles. First assistants have shown less awareness about the triangles which may be termed as unsatisfactory. All the surgeons who took part in the present study understood the UAD with great ease and found it to be comprehensive or total and much easier to remember during the procedure.

Conclusion: Unified Area of Danger encompasses all the danger zones and is easier to follow during the procedure by operating surgeons and assistant surgeon.

Introduction

Emil Theodre Kocher (a name synonymous with thyroid surgery), had significantly reduced the operative mortality for thyroidectomy and now thyroid surgery defines a surgeon's precision.

Even though as a surgery being performed regularly, thyroidectomy still carries considerable rate of morbidity which is dreaded like dyspnea, haematoma, hypoparathyroidism. To solve this difficulty many triangles have been described like

the Joll's triangle or triangles of concern. But how useful are these triangles in everyday practice remains obscure.

Joll's Triangle

Also known as sternothyrolaryngeal triangle.

Joll's triangle is of importance since external branch of superior laryngeal nerve lies within this triangle. It's boundaries are:

Lateral border Upper pole of thyroid gland and superior thyroid vessels

Superiorly: Attachment of the strap muscles,

Medially: Midline

Floor: cricothyroid muscle.^[1]

Behr's Triangle

The recurrent laryngeal nerve (RLN), common carotid artery (CCA) and inferior thyroid artery (ITA) forms three sides of this triangle.^[1]

Area of Concern

This triangle consist of RLN, the trachea and the root of the neck. The sites of bleeding during thyroidectomy are middle thyroid veins, inferior thyroid veins and branches of inferior thyroid artery in the vicinity of RLN.^[1]

Proposed Unified Area of Danger^[2]

It's borders are:

Superior: STA

Inferior: ITA

Medial: Trachea

Lateral: Carotid sheath

Material and Method

Approval of Institutional ethics committee was obtained.

Design of Study: Observational Study

Inclusion and Exclusion Criteria

All respondents were Endocrine/ General/Onco-Surgeons/ENT surgeons.

Surgeons with minimum 3 years of experience were enrolled for the study. Surgery residents were excluded from the study. A Questionnaire was designed, which included 8 statement questions.

The questionnaire was distributed to the surgeons during each thyroidectomy procedure 10 minutes before intubation and was collected on the 5th Post operative day. The questionnaire was also put in the Google form and was sent to the surgeons in MAMC Delhi, KIMS Bhubaneswar, AIIMS Bhubaneswar, IPGMER Kolkata and PGI Chandigarh. Convenient sampling was done within a duration of 4 months, all the responses received were checked for being complete or not.

Total 80 responses were received, but 15 responses were incomplete and were rejected and 65 responses were finally taken in to account for our study.

Data collected was analysed using appropriate tests of significance in SPSS (Statistical package for Social Sciences) R Version 3.02.



Fig. 1 Boundaries of Unified Area of Danger intraoperatively.



Fig. 2

Results

A total of 80 surgeons participated in the study. Majority who were operated were females 54 (83.1%).

About 38(58.5%) were planned for total thyroidectomy 23 (35.4%) were planned for hemithyroidectomy, Lymph node dissection was done in 13 (20.0%) of the patients.

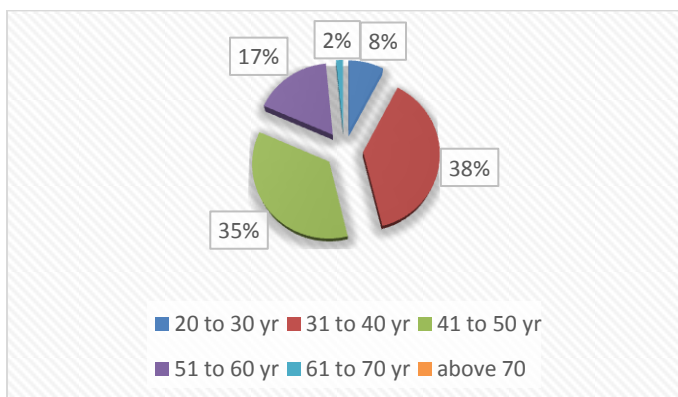


Fig. 3: Patient Age Distribution

Table 1: Awareness about Triangles

| N=65 | Joll's Triangle | Behr's Triangle | Triangle of Concern |
|------------------|-----------------|-----------------|---------------------|
| Surgeons | 63 (96.9%) | 63 (96.9%) | 62 (95.4%) |
| First Assistants | 44 (67.7%) | 38 (58.5%) | 37 (56.9%) |

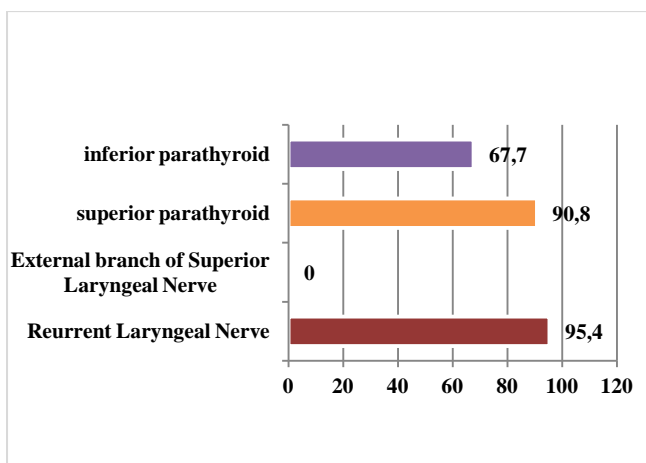


Fig. 4: Usefulness of unified area of danger

| | PRESENT STUDY | PREMKUMAR A, 2018[2] |
|--|---------------|-----------------------------|
| SURGEON'S AWARENESS REGARDING TRIANGLES | 96.40% | 39% |
| AWARENESS OF FIRST ASSISTANT REGARDING TRIANGLES | 61.03% | -- |
| SURGEONS FELT THESE TRIANGLES ARE USEFUL | 52.8%(used) | 4.88%(used) 36.55%(Felt) |

Although 63 surgeons were aware of Jolls triangle only 34 had utilised it to protect the superior laryngeal nerve, which is 52.30%.

Out of 63 surgeons who were aware of the Behars triangle only 34 had utilised it to protect the RLN which is 52.30%.

Out of 62 surgeons who were aware of triangle of Concern only 35 had utilised it to protect RLN and to prevent bleeding which is 53.80%.

Ease of understanding UAD amongst the surgeons is 100%.

Discussions

Surgeons are aware about the triangles.

First assistants have shown less awareness about the triangles which may be termed as unsatisfactory.

All the three triangles have received fair amount of utility among the Surgeons which is evenly placed with Behr's triangle having little less uses.

In the present study the inferior Parathyroid glands and superior parathyroid glands were found in the unified area of danger in 67.70% and 90.8% of cases respectively. recurrent laryngeal nerve was found in the unified area of danger in 95.40% of cases. External branch of Superior laryngeal nerve is not found in this area but the surgeon can be cautious while dissecting near the superior border of unified area of danger and thus can protect the nerve. Unified area of Danger is made comprehensive or total, so that the operating surgeon can be cautious in this zone

Since this is a single area it is easy for the surgeon to remember during the procedure.

Limitation of the study

The study has shown insignificant p values i.e. For Joll's triangle Fisher's Exact Test, $df=1$, p value= 1.000, Beahr's triangle $p=1.000$, For Triangle of concern $p=0.591$. The survey needs to be conducted on large number of surgeons and they need to be made aware of unified area of danger to overcome the limitations of the study.

Conclusions

"Unified area of danger" encompasses all the danger zones and it's much easier for the surgeons to remember a single area where they should be cautious.

References

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