Minimum incision length for vertical incision cricothyroidotomy – An observational study

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Background and Goal of Study

A vertical incision is recommended for cricothyroidotomy when anatomy is indistinct but no evidence-based guideline exists regarding optimum site or length. The Difficult Airway Society (DAS) guidelines, which are based on expert opinion, recommend an 80-100mm vertical caudal to cephalad incision. However the guidelines do not advise the point from where one should commence this incision. We sought to determine both the minimum incision length and starting point above the suprasternal notch (SSN) required to ensure the cricothyroid membrane (CTM) would be accessible within the margins of the incision.

Materials and Methods

The distance between the suprasternal notch and the CTM was measured using ultrasound in both neutral and extended positions. We assessed 'capture' of the CTM within theoretical incisions of 0-100mm in length made at 10mm intervals above the suprasternal notch. Our aim was to determine the optimum length of incision and the point from which the incision should commence.

Results and Discussion

There were 80 patients included in this study, 40 male and 40 female. In total 160 CTM assessments were performed across both patient groups. There was a large variation in the location of the CTM in relation to the suprasternal notch across all patients and head positions (27 – 105mm). The minimum incision required for the male group was found to be 70mm commencing 30mm above the SSN. In the female group the minimum incisions were 70mm and 80mm, commencing 20mm and 30mm above the SSN, for the neutral and extended head positions respectively. An 80mm incision commencing 30mm above the SSN would be required for all subjects, regardless of sex, in the extended neck position. For the neutral position an 80mm incision commencing 20mm above the SSN would achieve successful 'capture' of the CTM in both male and female subjects

Conclusion

In keeping with the DAS guidelines regarding procedure performance in the extended neck position, the minimum incision required to 'capture' every subject CTM in our study would be 80mm commencing 30mm above the SSN.

Incision Start-point (distance above suprasternal notch in mm)

	0mm	10mm	20mm	30mm	40mm	50mm
0mm	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2.5%)	3 (3.75%)
10mm	0 (0%)	0 (0%)	0 (0%)	3 (3.75%)	14 (17.5%)	13 (16.25%)
20mm	0 (0%)	0 (0%)	3 (3.75%)	15 (18.75%)	24 (30%)	31 (38.75%)
30mm	0 (0%)	3 (3.75%)	15 (18.75%)	25 (31.25%)	42 (52.5%)	49 (61.25%)
40mm	3 (3.75%)	15 (18.75%)	25 (31.25%)	43 (53.75%)	60 (75%)	63 (78.75%)
50mm	15 (18.75%)	25 (31.25%)	43 (53.75%)	61 (76.25%)	74 (92.5%)	67 (83.75%)
60mm	25 (31.25%)	43 (53.75%)	61 (76.25%)	75 (93.75%)	78 (97.5%)	68 (85%)
70mm	43 (53.75%)	61 (76.25%)	75 (93.75%)	79 (98.75%)	79 (98.75%)	68 (85%)
80mm	61 (76.25%)	75 (93.75%)	79 (98.75%)	80 (100%)	79 (98.75%)	68 (85%)
90mm	75 (93.75%)	79 (98.75%)	80 (100%)	80 (100%)	79 (98.75%)	68 (85%)
100mm	79 (98.75%)	80 (100%)	80 (100%)	80 (100%)	79 (98.75%)	68 (85%)