

Case Report

Novel surgical retractor “the spoon”

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A 51 year old Chinese lady was referred to our service for removal of a large multinodular goiter. She was euthyroid and asymptomatic, but intolerant of the resultant cosmesis. Ultrasound imaging of the thyroid revealed a goitre of 150 cm³. There were no suspicious features. She was counselled for open total thyroidectomy and thyroxine supplementation.

Amidst the increasing popularity of endoscopic and robotic thyroidectomy, open surgery remains the standard of care for bulky disease and previously operated fields. Open thyroidectomy, still employs the surgical tooling of the 20th century, such the retractors of Lagenbeck and Lahey. While versatile, they are suboptimal for separating slippery, bulky tissue from delicate structures in the neck, particularly the recurrent laryngeal nerve. Appendages such as the tubercle of Zuckerkandl further preclude their exposure. We present the development of a novel device to facilitate optimal re-

traction of thyroid and its vestiges.

We were inspired by our esteemed faculty, who autoclaved an ordinary metal tablespoon to be repurposed as a retractor. This left much to be desired as it would slip off the tissues, owing to its shallow parabolic cross-section.

Using Computer Aided Design (CAD), a 3-dimensional model of the retractor was constructed. Prototyping was conducted successively using plastic filament, resin and metal 3D printing. A functional modal was manufactured using direct metal laser sintering (DMLS) in surgical grade stainless steel (316 L alloy) [01]. It features a cupped head with a slim, atraumatic lip, with an ergonomic handle for both the assistant and the operating surgeon. It was exempt from registration by local authorities governing medical device usage.

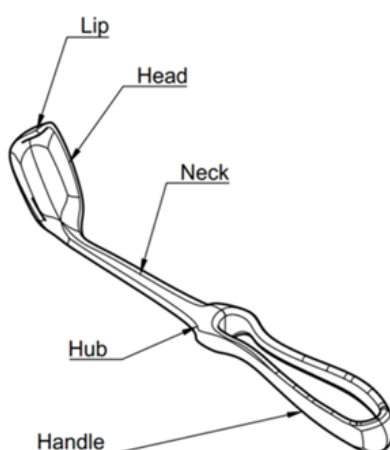


Figure 1: Diagrammatic representation of The Spoon retractor

The resultant retractor was employed in the aforementioned case. The cupped shape was able to envelope the tissues (whilst the Lagenbeck had the tendency to gouge instead) and retract the large gland without slippage (as was the issue with finger retraction). It proved adept in manipulating the tubercle of Zuckerkindl, measuring 3x2 cm in itself. The

surgery was performed uneventfully. Nerve function was preserved. A closed suction drain was placed, in view of the extensive dissection. This was removed on postoperative day 2, prior to the patient's discharge. Her recovery was deemed uneventful at outpatient follow-up.

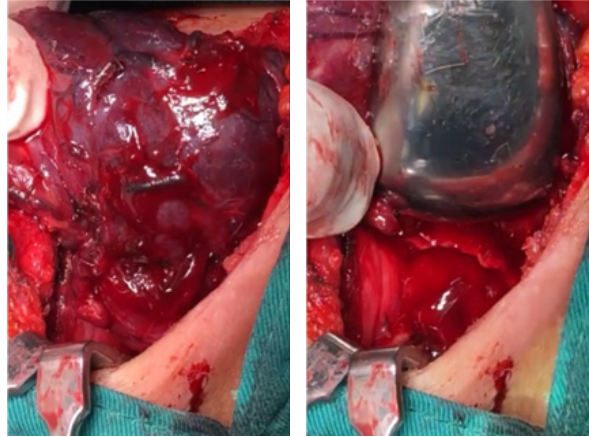


Figure 2: Retraction of the tubercle of zuckerkindl

Subsequent refinements were made to the angulation of the retractor to optimize ergonomics. An additional model with a narrower head was produced to facilitate variations in patient anatomy. The retractors have been incorporated into routine thyroid surgery in our institution.

In conclusion, this novel surgical retractor displays advantages over contemporary surgical retractors for obtaining tissue exposure during open thyroidectomy. Its rapid development and production was made possible using 3D printing.

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References

1. Abbott, K. W., Green, J. F., & Keohane, R. O. (2016). Organizational ecology and institutional change in global governance. *International Organization*, 70(2), 247-277.