

A MDT Bespoke Headrest Solution

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This case study describes the development of a bespoke foam carve head support to achieve optimal head position in a 14-year-old with acquired tracheal stenosis following long term intubation as a neonate.

A number of head supports had been trialled previously, but none were able to orientate and hold his head in a position to optimise his airway. The desired position was a bilateral jaw lift and thrust forward which was not possible with off-the-shelf solutions.

The most common cause of benign acquired tracheal stenosis is mucosal injury from endotracheal intubation. (Aslier, Yildirim and Coşkun 2022) Additional tissue can form in the airway, reducing the size of the already small airway lumen. (Mok 2017) This results in the individual presenting with stridor, apnoea and difficulty managing secretions.

The client was referred to the wheelchair service in 2023 for assessment for an alternative headrest. The speech and language therapy (SALT) team specifically wanted to optimise head position to improve swallow for secretions and open the airway more for breathing.

A multi-disciplinary team (MDT) assessment was arranged by the Wheelchair Service with Contour 886, school physiotherapists, occupational therapists, speech and language therapists, residential carers and school staff. It was important to have all these professionals involved in the assessment to ensure all aspects of the client's posture and medical needs were considered.

At the second appointment, a mould was taken using a template headrest bracket and the therapy team working together to hold the moulding bag in position to achieve the desired jaw position.

Considerations for the manufacture included:

- A swing-away option as the required contours of the headrest around the jaw would interfere with hoisting. Choice of material for this to consider hinges to be potentially operated multiple times a day.
- Composition of foam to be strong enough to maintain the required shape.
- Bracketry to mount to existing seating system and allow easy interchange with the existing headrest.
- Headrest cover to take into account excessive sweating.

Further mid-fit appointments allowed us to identify the most suitable position for the swing-away hinges, and the precise contouring of the headrest around the jawline to achieve the necessary jaw position. Further refinement of the contouring of the headrest were also made at a subsequent appointment to further optimise the position.

Challenges faced included dystonic movements, changes to seating and ease of repeatable positioning. A number of different types of headrest bracket were also trialled in order to find a solution that would withstand the client's strong dystonic movements whilst also ensuring that the desired jaw position was maintained.

Risk assessments were developed and discussed with the MDT to ensure everyone was happy with implementation of the headrest.

The final shape of the headrest showed visible improvements of the position of the tongue and audible reduction of stridor, together indicating that secretions were reduced, swallow effectiveness improved and airway relaxed.

This case study demonstrates the importance of multi-disciplinary collaboration across medical, educational, social and therapeutic teams working together in order to find the best outcome for our client.

An iterative approach to the design was vital to ensure that the final shape and composition achieved the desired lift of the chin to optimise breathing and reduce stridor. It was also important to build methods of adjustability into the design so that modifications could be made post manufacture.

It is anticipated that the position and shape of the headrest will need to be modified as the client continues to grow.

References

- [1] Aslier, M., Yıldırım, M.F. and Coşkun, H. (2022). Treatment Results and Postoperative Complications of Single-Stage Tracheal Resection in Adolescent Patients with Post-Intubation Tracheal Stenosis, Compared to Adults. *Turkish Archives of Otorhinolaryngology*, 60(1), pp.1–8. doi:<https://doi.org/10.4274/tao.2022.2022-2-8>.
- [2] Mok, Q. (2017). Airway Problems in Neonates—A Review of the Current Investigation and Management Strategies. *Frontiers in Pediatrics*, 5. doi:<https://doi.org/10.3389/fped.2017.00060>.

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