



ENT CENTRAL

ROBOTIC HEAD & NECK SURGERY



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EAR, NOSE, THROAT, HEAD & NECK, FACIAL PLASTIC SURGEON

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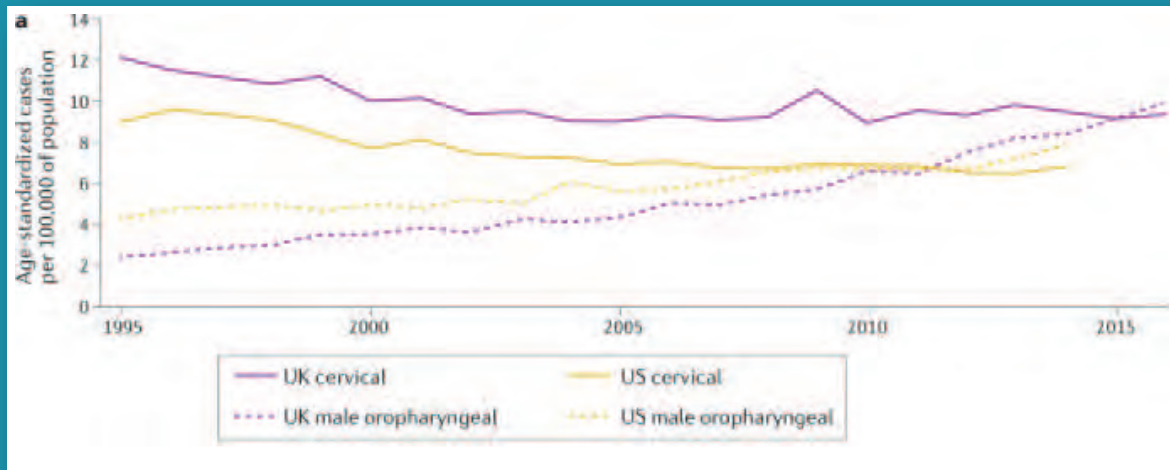
TRANSORAL ROBOTIC SURGERY (TORS)

Transoral robotic surgery (TORS) is an advanced minimally invasive alternative to open surgery, or transoral laser surgery, for the treatment of some head and neck pathologies like tumours of the oropharynx, hypopharynx and larynx; and particularly oropharyngeal carcinoma, which is rapidly increasing in incidence.

It is a complex procedure which an experienced surgeon performs through the mouth of the patient using robotic arms. It is performed under general anaesthesia and has been shown to be cost-effective, with significantly shorter hospital stays and fewer treatment-related costs.

RISE OF OROPHARYNGEAL CANCER

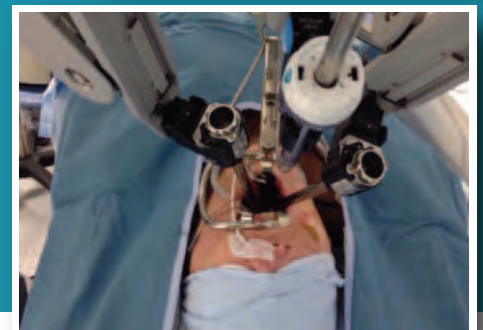
The incidence of Oropharyngeal Cancer (OPC) is increasing alongside rising rates of human papillomavirus (HPV) infection. This surge in population-level incidence, amounting to a 225% rise, is being recognised as an 'epidemic' globally. Typically, HPV-associated OPC affects middle-aged, affluent males, contrasting with conventional oral cavity **Squamous Cell Carcinoma (SCC)** which is more prevalent among elderly people from comparatively lower socioeconomic status, often with histories of smoking and alcohol use.



Traditionally, the primary treatment for oropharyngeal SCC involved chemoradiotherapy (CRT) or radical surgery with mandibulotomy and neck dissection for advanced disease salvage. CRT, while allowing organ preservation, necessitates daily treatments over six to seven weeks and is linked with various morbidities including mucositis, xerostomia, taste loss, speech and swallowing impairments, dental issues, and osteoradionecrosis. Similarly, open surgery carries significant morbidity and requires prolonged hospitalisation.



The advent of Transoral Robotic Surgery (TORS) has started to revolutionise OPC management.



TORS – EQUIPMENT & PROCEDURE

TORS uses a robotic surgical system such as the **FDA-approved da Vinci® Surgical System** which includes robotic arms that are equipped with miniature surgical instruments and a camera that provides a high-definition (HD), 3D-magnified view of the surgical site enabling head and neck surgeons to remove both benign and malignant tumours in oropharynx, larynx and hypopharynx. It employs principles of telemanipulation that enables the surgeon to perceive stereoscopic images and enables movement of remote effector, i.e. robot, and allows to copy the movements and manipulation of operator in the console onto the instrument arms which is electronically aligned. These operator movements get translated and duplicated to minimally invasive instruments on robotic arms that dissect out tissues with high precision and accuracy.

The robotic system consists of three parts:

- Surgeons Console: 3D HD visualisation by Surgeon operating in an adjustable, individually pre-programmed ergonomic position with which the surgeon (seated) remotely controls the robotic arms.
- Patient-side robotic cart with three robotic arms positioned inside the oral cavity one handling the 12 mm endoscopic camera and two holding 5 mm EndoWrist instruments.
- Mobile Tower (3D-Vision) Cart: Image processing equipment (12 mm stereoscopic endo + two 3 chip camera + two optic channels) and Widescreen HD monitor.



Figure 1. Illustration of surgical system robot

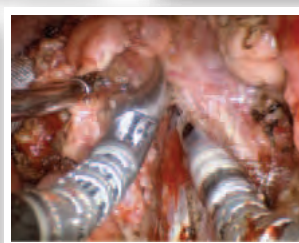
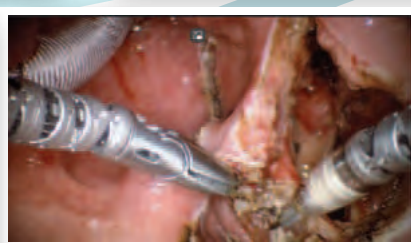
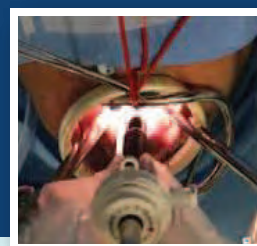
A - surgeon's console; B - patient-side robotic cart; C - high-definition, 3D vision cart

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The surgeon operates the mechanical arms from a console located near the operating table. Its HD camera provides heightened visualisation, magnified detail, true depth of field and a comprehensive view. Once the patient is under general anaesthesia, the robotic arms are inserted through the mouth (transoral) of the patient to reach the targeted area, thereby avoiding the need for external incisions.

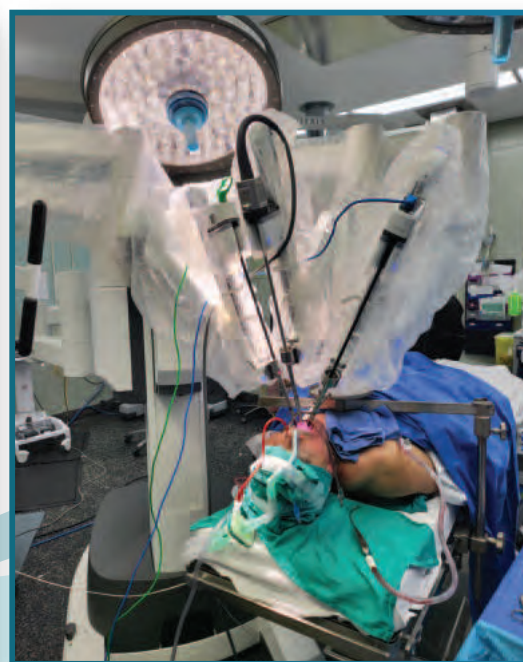
The movements of the surgeon's hands are then translated into precise movements of the robotic instruments inside the patient's body, enhancing a head and neck surgeon's skills. The surgical console's exceptional ergonomics boosts human capabilities through wristed instruments that can bend and rotate over a wider range than the human hand, to remove tumours, perform tissue biopsies, or reconstruct affected areas. Overall, the TORS approach results in precision and control when operating in the upper airway, hence minimising trauma to surrounding tissues and reducing recovery time after surgery.



DR NAVEED BASHEETH PERFORMS TORS

Dr Naveed Basheeth performs Transoral Robotic Surgery at Southern Cross North Harbour Hospital, Auckland, for patients diagnosed with benign throat tumours and early-stage throat cancer. Dr Basheeth completed his training in TORS in QE2, NSHA, Dalhousie University, Halifax, Canada, and is one of the very few Robotic Head & Neck Surgeons in New Zealand, **Certified by Intuitive** to perform TORS.

He works with his TORS team to achieve the most satisfactory outcome for patients. Being minimally invasive, patients are encouraged inherently, to consider this emergent state-of-the-art robotics for cancer, sleep apnoea and other throat related conditions.



INDICATIONS & CANDIDATURE FOR TORS

Candidates for TORS are typically those with conditions of the head and neck that are suitable for transoral access. Factors such as tumour size, location, and patient health are considered in determining eligibility.

TORS is primarily used for removing small to moderate-sized (up to 4 cm) oropharyngeal cancers, such as those found in the tonsils, base of tongue, and soft palate. It is also employed for excising other types of benign and malignant growths in the oropharynx, hypopharynx, and larynx (voice box). Obstructive sleep apnoea caused by enlarged tonsils or base of tongue, can also be treated. This robotic treatment is also suitable for people with unknown/undiscovered primary squamous cell carcinoma aka **Carcinoma Unknown Primary (CUP)**, during which the pathologist usually finds the source of the primary tumour.

Additionally, TORS has been successfully utilised for procedures like skull base surgery, partial supraglottic laryngectomy, total laryngectomy, treatment of parapharyngeal tumours, closure of paediatric laryngeal clefts, and various reconstructive surgeries.

TORS is also used on tumours located in the oral cavity in the posterior tongue, where access remains challenging through conventional means.

COMPARISON TO CONVENTIONAL TREATMENT OPTIONS

Accessing the oropharynx poses challenges, often requiring complex surgical methods like mandibulotomy, that last long hours, involve extensive dissection and often necessitates further procedures. Transoral laser surgery offers a less invasive option but has limited visibility and technical difficulty due to the use of long manipulators.

TORS has currently become the leading minimally invasive technique by utilising a transoral approach that eliminates the need for external incisions, thereby avoiding facial scarring. Comparatively, this procedure offers superior cosmetic results, fewer complications, less postoperative discomfort, and reduced hospital stays combined with better results with restored speech and swallowing abilities.

For about a third of patients, TORS can effectively serve as a standalone treatment, sparing them the side effects of chemoradiotherapy and reducing the need for multiple outpatient visits. While the majority of patients may still require adjuvant radiotherapy or chemotherapy after TORS, these treatments can be administered with potentially reduced doses and treatment durations, resulting in fewer side effects.

Generally, for cancer, surgery is recommended as initial cure. But those who wish to undergo chemotherapy or radiation therapy as the primary treatment (before undergoing surgery) can also opt for TORS later. However, performing a **salvage surgery** (surgery as the secondary option after chemotherapy or radiation therapy) will subject the patient to unpredictable postoperative scenarios along the lines of survival, healing and good swallowing functions.

ADVANTAGES OF TORS

- **Precision:** The robotic system provides enhanced dexterity and precision, with the elimination of tremor, allowing surgeons to manoeuvre in tight spaces and perform intricate movements with greater accuracy than traditional techniques.
- **Advanced Technology:** High resolution, three-dimensional optics and magnification allow for excellent visualisation. Wristed instruments enable delicate tissue handling. Challenging tasks such as endoscopic suturing may also be performed.
- **Less Invasive:** Compared to open surgery, which requires a long ear-to-lip incision to access the tumour – and in some cases also requires breaking the jawbone – TORS reduces the need for external incisions leading to reduced blood loss and less postoperative pain and no visible scarring.
- **Reduced Complications:** By accessing the surgical site through the mouth, TORS reduces the risk of damaging surrounding nerves, blood vessels and tissues.
- **Quicker Recovery:** Patients typically experience shorter hospital stays (1-2 days, versus 7-15 days). They return faster to speaking and swallowing (as early as the day after surgery) and there is a reduction of possible swallowing or speech issues.
- **Minimal Postoperative Treatment:** Patients speak of less post-surgical pain and less medication is required. There is a reduction (or even elimination) in the need for chemotherapy or radiation, particularly for early-stage cancers. No tracheotomy is needed.
- **Cost Efficiency:** Reduction of OR time, necessary staff, utility of materials, and length of hospital stay, all translate to cost savings to the hospital and ultimately to each patient.



EXTENDED APPLICATIONS OF TORS

- | | |
|-----------------------------------|---|
| ● OSA surgery | ● Craniocervical junction |
| ● Flap inset | ● Atlantoaxial spine |
| ● Recurrent cancers | ● Infratemporal fossa |
| ● Parapharyngeal space tumours | ● Retro/para pharyngeal space approaches |
| ● Retropharyngeal node dissection | ● Trans-vestibular thyroid approaches |
| ● Thyroidectomy | ● Total transoral laryngectomy |
| ● Neck dissection | ● Transoral supracricoid partial laryngectomy |

Non FDA Approved Robotic Procedures
UPPP for OSA
External & Internal Laryngocoele excision
Resection of Retropharyngeal Lymph nodes post CTRT

Other Robotic Head and Neck Procedures
Thyroidectomy – Transaxillary, Facelift
Thyroidectomy with Retroauricular approach
Robotic Neck Dissection

ADVANTAGES		DISADVANTAGES
Patient	Surgeon	
No facial scar/lip split/neck incision	3D Visualisation with magnification + Cost motion scaling	Cost
Decreased Trachy rates	Improved access, MIS & better manoeuvrability	Technically challenging surgical procedure
Rapid swallowing rehabilitation Improved functional outcome (SLT)	Improved surgical precision, physiological surgical tremor filtration	Learning curve
Decreased blood loss	Increased range of motion Wrist-6° & FOM 360°	Loss of tactile feedback
Less pain, Less scarring	Improved dexterity	

RATIONALE FOR TORS

- It is part of investigative pathway for CUP - Small tumours, Laterality, Resection
- Pick up rate of -50% (in cases deemed CUP after PET-CT and palatine tonsillectomy)
- Helps patients understand the disease
- Helps clinicians guide treatment decisions, treatment de-intensification, reduce morbidities, improve survival

OTHER TREATMENTS IN COMBINATION WITH TORS

TORS is usually combined with neck dissection (unilateral or bilateral). This surgery is used to remove groups of lymph nodes from the neck. This part of the operation is done without a robot.

Some patients who have undergone TORS will go on to require radiotherapy and/or chemotherapy depending on the final pathology report.

INTUITIVE

Certificate of Training Equivalency as a
Resident or Fellow

Naveed Basheeth

has successfully completed the equivalent requirements of
Intuitive's technology training program covering the components
and use of the Intuitive system, instruments, and accessories
as verified by the Program Director

Date:
29-December-2022

Residency/Fellowship Program

Queen Elizabeth II Health Sciences Centre

Platform:
Da Vinci Xi surgical system

Program Director:
Martin Corsten

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FGOLF (IFHNOS-MSKCC), CCT (UK&Ireland), IBCFPRS**

Fellowships:

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Cambridge University-Addenbrookes-UK)

Advanced Head and Neck Microvascular Reconstruction, Robotic Surgery and
Advanced Facial Plastic Surgery (Dalhousie University, Halifax, NS, Canada).

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