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# ANAESTHESIA MANAGEMENT IN A CASE OF ROBOTIC ASSISTED MINIMAL INVASIVE MCKEOWN OESOPHAGECTOMY COMBINED WITH TOTAL THYROIDECTOMY - A CASE REPORT

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**ABSTRACT** **Summary** Minimally invasive Oesophageal cancer surgeries require Transthoracic esophagectomy, mediastinal lymphadenectomy and laparoscopic gastric conduit reconstruction .With advent of Da Vinci robotic assisted minimally invasive surgery there has been better surgical outcomes and less post operative complications and mortality when compared to an open esophagectomy .We Describe a case report of anaesthetic challenges and management in a 48 years male who was successfully operated for biopsy proven adenocarcinoma of distal esophagus with Robotic assisted minimally invasive Oesophagectomy along with Total thyroidectomy and Neck dissection for incidental Thyroid lesion in PET CT reported as papillary Thyroid carcinoma , with a single lumen flexometallic tube .Pre operative Preparation,intraoperative challenges including Positioning,duration,Temperature,blood loss,Post op recovery have been detailed in this case report.conclusion-An effective preoperative optimization of the patient, incorporating recent advances, vigilant monitoring early recognition of complications with prompt anaesthetic management will give better surgical outcomes in Robot assisted esophageal surgery.

**KEYWORDS :** Robotic esophagectomy,anaesthesia for esophagectomy,double lung esophagectomy

## INTRODUCTION

The primary curative treatment for esophageal cancers are presently surgery. Esophagectomy is a technically demanding procedure with a high morbidity and mortality rate especially in open techniques[1]. Attempts to lower these rates have prompted the use of minimally invasive techniques. However, traditional video-assisted surgery has some limitations, such as a two-dimensional view and mobility limitations, which could make a complicated procedure like esophagectomy challenging[2].

Da Vinci Robotic surgery assisted minimally invasive esophagectomy reduces the limitations of thoracoscopic esophagectomy by allowing for a stable three-dimensional (3D) view, a 10-fold-enlarged image, a restored eye-hand axis, and outstanding visualisation.With the Robotic approach only minimal incisions were needed and advantages were minimal blood loss,less post-operative pain scores,early recovery and Discharge[3].

Disadvantage being Learning curve,physiological implications of positioning during Robotic thoracoscopy and access to the patient and prolonged duration being a challenge to the anaesthetist especially when combined with surgery of other speciality which in our case is Total thyroidectomy with neck dissection which increases the anaesthetic challenges like positioning,Temperature,access and pain management[4][5].

### Case report

We report a case of 48 year old male who had history of dysphagia for 2 months to solid diet,gradually progressive which was worsened last 15 days before admission and with history of weight loss upto 2 kg. Patient is a known case of Systemic hypertension for 4 years on regular medication Telmisartan and Ex Smoker with 2 Pack years.His Gastrointestinal endoscopy showed ulcerative growth - adenocarcinoma(ypT3pN2) and peritoneal biopsy negative for metastasis.PET CT scan showed hypermetabolic nodule of Thyroid its FNAC - papillary carcinoma of Thyroid(pT1bpN1) planned for a combined Robotic mckeown Oesophagectomy and Total thyroidectomy with right and central selective neck dissection

### Preoperative preparation

On preoperative assessment patient Comorbidities and functional status had been evaluvated with investigations like complete blood count,renal function tests,Liver function tests, electrolytes. Echocardiogram and pulmonary function tests were performed and cardiologist clearance obtained.Patient demographics Weight 72 kg Ht -170 cm.Blood pressure-130/80mmHg, Heart rate -70/mt, spo2 98% in room air

### ASSESMENT,OPTIMIZATION AND CONSENT

Patient Hemoglobin-13.5g/dl,platelets -220×10³,LFT T.B - 1.2 serum Albumin -3.5 Normal AST/ALT Creat 1.0.

Echocardiogram -Ejection fraction 62% Normal LV Systolic function.Pulmonary function test normal. Electrolytes sodium - 140meq/L, potassium -3.0 meq/L for which potassium correction started with potassium chloride.Nil by mouth started 8 hrs before surgery along with continuous maintenance fluid replacement.Electrolytes are repeated on day of surgery Na +142 ,K+ 3.5.

### Perioperative management

### Induction

Patient Identity confirmed prewarming started.Monitors were attached and baseline vitals,Temperature recorded.Awake epidural performed and catheter secured at level of T11-T12.Arterial line with 20 Leader catheter.patient was awake preoxygenated and induced with Intravenous agents Propofol 2mg/kg, Fentanyl 1mcg/kg and Rocuronium 1.2mg/kg Rapid sequence with Sellick cricoid pressure and intubated with Flexometallic tube 8.5 mmOD and secured. 16F Ryles tube cautiously inserted with xyloxaine jelly and secured in 30cm.

### Maintenance

Anaesthesia Maintenance with Air, oxygen and sevoflurane MAC 0.9-1 acheived and Atracurium infusion started .Fentanyl repeated 0.5mcg/kg as per hemodynamic response.

### POSITIONING

Patient then positioned prone in the operating table with the help of multiple personell over chest and pelvic hard pillows and face with soft pillow and Right arm hyper abducted for adequate Robot approach.care taken for eye protection with gauze pad cushioning.Both the lungs were deflated and pneumo Thoracoscopic Insufflation done with co2 with 9 mmHg.ventilator set with volume control low tidal volume, High respiratory rate.After esophageal dissection robotic arms undocked and patient turned supine and to low lithotomy position and shoulder roll and neck extension for Thyroidectomy by the ENT team.Once gastric dissection to crux done,ryles tube repositioned and thyroidectomy neck dissection completed with visibly preserving parathyroid gland and Bilateral Reccurent laryngeal nerve,gastric pull up and esophageal gastric anastamosis done in neck and closure done.

### EXTUBATION

once neck pull up and oesophageal gastric anastomosis completed, Atracurium infusion and sevoflurane administration were stopped, and patient extubated after 25 minutes.Patient shifted to post anaesthesia care unit where chest x ray done and shifted to surgical high dependency unit and epidural infusion of 0.18 %Ropivacaine with fentanyl 2mcg/ml at 6ml/hr with Arterial Pressure monitoring.

**Figure 1 -** Intraoperative positioning,Robot Docking and Thoracoscopic dissection newer ventilators modes and post op Chest x ray images compilation

**Table 1 - Timelines in the course of surgery**

| | |
|---|---|
| Total duration of surgery | 8 hours |
| Wheel in To Robo Dock | 45 minutes |
| Davinci console Thoracoscopic dissection | 120 miutes |
| Laparoscopic gastric dissection and conduit alongside thyroidectomy | 180 minutes |
| Neck dissection Gastric pullup Resection anastamosis | 120 minutes |
| Neck closure to extubation | 25 minutes |
| Epidural infusion until | POD 2 |
| Ward shifting | POD 3 |
| Oral fluids trail | POD 5 |
| Ryles tube removal | POD 10 |
| Discharge | POD 11 |

**Discussion**

Robotic mckeown minimally invasive esophagectomy offers excellent surgical approach minimal blood loss and success rates with its own physiological implications like positioning,co2 pneumo thoracoscopy, single lumen low tidal volume ventilation which were successfully managed in our case[6][7]

The course of surgery were

PRONE POSITION---> Da vinci Robot Docking ---> pleural adhesionolysis ,esophageal dissection from carina to hiatus/Azygos clipped----> ICD closure--->Undocking of Robo--->SUPINE--->Low lithotomy position --->laparoscopy---> stomach dissection up to crus--> mini laparotomy and gastric conduit---> vascularity confirmation with Indoctanine green---> Total thyroidectomy started alongside gastric dissection ----> Neck dissection and node clearance completed---> stomach pulled upto neck---> esophageal tumor transection and esophageal gastric anastamosis---> Neck closure.

**Preoperative challenges**

Patient was hypokalemic relatably due to nutritional factors and potassium replacement started two days before surgery and potassium on day of surgery was 3.5meq/l.Nebulization started in view of smoking history.

**Intraoperative challenges and Management**

Prone positioning required adhesive straps for stable position and care taken for avoiding compression in eyes.Arterial lines were secured precautiously while positioning prone..Ventilation issues- Low Tidal volume and high respiratory rate ventilation requirement for better access and vision to dissect Oesophagus with Robotic arms.No surgical limitations with single lumen ventilation were faced by the surgeon.Eye protection had been taken care with soft pillow eye gauze pads.Fluid therapy with isoosmolar crystalloids were used and fluid Restriction until Robo undocking in view of pneumothorax with co2.Followed by maintenance and replacement fluids.Limited access during Combined thyroidectomy and gastric dissection.Blow over warmers were used in limited space possible.Arterial blood gas analysis done intraop pH -7.40 ,pco2 40,po2-197 Hco3 -26,Na-139 K+ 3.12,.potassium replacement with 10meq/hr started intraop and continued till extubation.Analgesia - Fentanyl boluses and epidural infusion with 0.25 bupivacaine at 6ml/ hr.Blood loss around 100-150 ml.Fluid input around 4 litres of crystalloids, urine output around 900 ml over 8 hours.No colloid fluids were used and no requirement of blood transfusion.The combined Total Thyroidectomy also poses its own risk like higher analgesic requirements, Risk of recurrent laryngeal nerve palsy and added blood loss which were managed effectively with surgeon anaesthetic team work,multidisciplinary input, incorporation of recent advances like newer ventilators modes, appropriate fluid therapy as per requirement,Arterial blood gas based acid basecorrection in intraoperative period,Thoracic epidural analgesia which reduces intraoperative and postoperative requirements.there were no incidence of stridor or delayed emergence occurred during extubation.**Post operative challenges**-Investigations like Complete blood count and renal function repeated on next day Hb 12.6 creatinine 1.0, potassium 4.0meq/L. Hypocalcemia in post operative period with low parathyroid hormone replaced with calcium gluconate and parathyroid hormone.Ward shifting done on post operative Pod-3 ,oral Iiquids from pod-5 ,Intercostal drainage removed on pod-8.Ryles tube removed on pod 10 and discharged after 11 days from date of surgery and on nuclear medicine follow up.opioids facilitating earlier recovery and reduced pulmonary complications.

Epidural requirement even in a supposedly minimally invasive surgery because of mini laparotomy incision required for gastric conduit so lower thoracic epidural was performed[8].Issues we faced were only preexisting hypokalemia which worsened in intraoperative period and hypocalcemia in post operative period due to low parathyroid hormone both managed effectively and also to note no intraop issues occured with single lumen Flexometallic tube and low tidal volume thereby reducing the placement and positional complications that were common with Double lumen tubes for single lung ventilation that were commonly used in robotic thoracoscopy[9][10].

## CONCLUSION

In this case report We had elaborated about successful management of combined Robotic mckeown esophagectomy and total thyroidectomy with a single lumen Flexometallic tube which is made possible by multidisplinary team co ordination which includes surgeon,anaesthetist and technicians,Biomedical team. An effective preoperative optimization of the patient, incorporating recent advances, vigilant monitoring early recognition of complications with prompt management will give better surgical outcomes in Robot assisted esophageal surgery.

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**Conflicts of Interest**: The authors have no conflicts of interest to declare.

**Informed Consent**: informed consent was obtained from the patient for publication of this manuscript and any accompanying images.No identity of the patient were published.

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