To CROSS or not: a case study of neoadjuvant CCRT for oesophageal cancer

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Declaration of interest

Muhammed Bapeekee

Nil to declare

Employment: Consultant Radiation Oncologist at Charlotte Maxeke Johannesburg Academic Hospital.

Case Summary

68-year-old female with no medical comorbidities, ECOG 0, diagnosed with SCC of the oesophagus, cT3N1MO, referred for neoadjuvant CCRT.

History

- 68-year-old female referred with 6-month history of progressive dysphagia and odynophagia, currently tolerating a soft diet. Associated loss of weight (<10%) and appetite, no hoarseness of voice or cough.
- Past medical history: HIV negative, no comorbidities, no history of caustic ingestion.
- Social history: no alcohol or tobacco use, no family history of any cancers.

Clinical Examination

- Alert and well, Vitals normal, BMI: 30.9kg/m, BSA: 1.89m^2
- ECOG 0
- General exam: no palpable lymphadenopathy, not pale, no jaundice or pedal oedema
- Systems exam: unremarkable

Investigations

- Biochemical: FBC/U&E/CMP and LFT normal (Hb 14.2g/dl, urea 2.3mmol/L, creatinine 81 umol/L, albumin 43g/dl

- Upper scope: lesion noted at 24cm from the incisors, unable to pass scope further, patient dilated

  Endoscopic ultrasound not performed due to equipment not available

- Biopsy: invasive moderately differentiated, keratinizing squamous cell carcinoma with high grade dysplasia. No lymphovascular or perineural invasion noted

- Radiological:

  - Barium swallow: Shouldering and narrowing of mid oesophagus, No tracheo-oesophageal fistula noted. Oesophago-gastric junction normal

  - CT Chest/Abdomen and pelvis: Upper thoracic oesophagus lesion noted from T3-T4 vertebral body. Fat planes of trachea and vessels are clear. Two mediastinal nodes noted, largest 16mm. Lungs, bones and liver normal with no lesions.

FDG PET/CT not performed due to resource constrained setting

Management

Patient assessed at MDT meeting with upper GI surgeon, radiation oncologist, medical oncologist and auxiliary services (oncology nurse, dietician and social worker)

Cancer of the upper thoracic oesophagus (SCC), atleast T3N1M0, for neoadjuvant CCRT followed by surgical resection.

Treatment intent is curable, Patient has a good performance status and as per MDT decision was determined that patient will tolerate expected treatment. Patient counselled about treatment intent, treatment details and expected acute and late side effects. Consent taken.

- Planning CT

Sedation	Nil
Positioning	Supine
Immobilization	Wing board used with arms above the head
CT instructions	Planning CT from angle of mandible to L5, 5mm slices, IV and oral contrast. *Motion management techniques not used: 4DCT, ABC DIBH and abdominal compression not available.*

- Dutch CROSS protocol used: Radiation dose 41.4Gy with concurrent carboplat AUC 2 D1 IVI weekly and paclitaxel 50mg/m2 IV D1

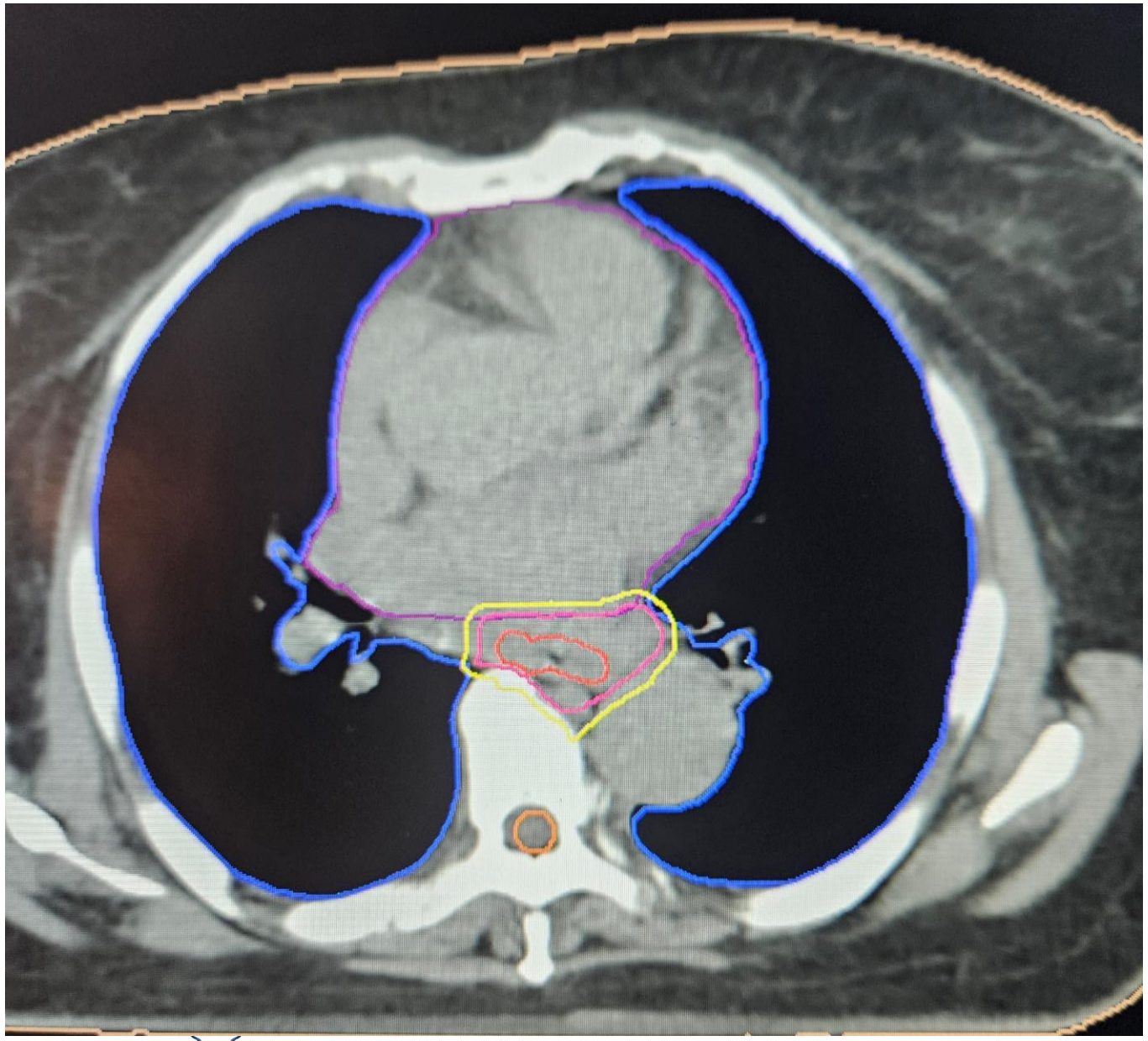
Shapiro J et al, CROSS study group. Neoadjuvant chemoradiotherapy plus surgery versus surgery alone for oesophageal or junctional cancer (CROSS): long-term results of a randomised controlled trial. Lancet Oncol. 2015 Sep;16(9):1090-1098. doi: 10.1016/S1470-2045(15)00040-6. Epub 2015 Aug 5. PMID: 26254683

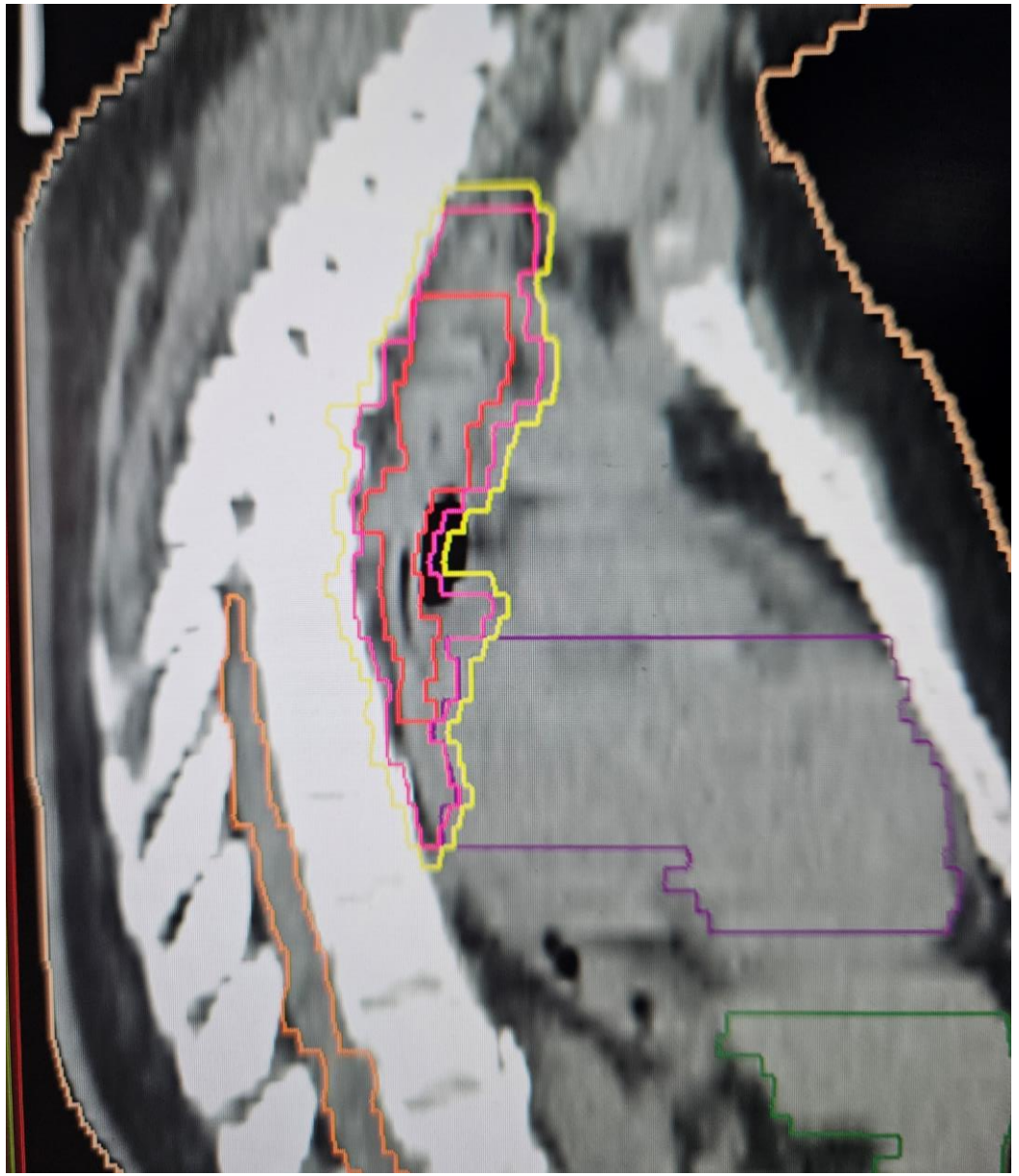
Contouring of delineated volumes

- Target volumes:

GTV	All visible tumour noted on planning CT. GTV primary and GTV nodes contoured. Diagnostic CT fused and used to aid delineation
CTV	Margin of 3cm superior and inferior used with 1cm circumferentially. Elective nodal coverage included periesophageal and mediastinal nodes. Margin cropped off vertebrae, lung, vessel and heart.
PTV	0.5cm margin added to CTV.

- Organs at risk contoured: bilateral lungs, heart, spinal cord, bilateral kidneys and stomach

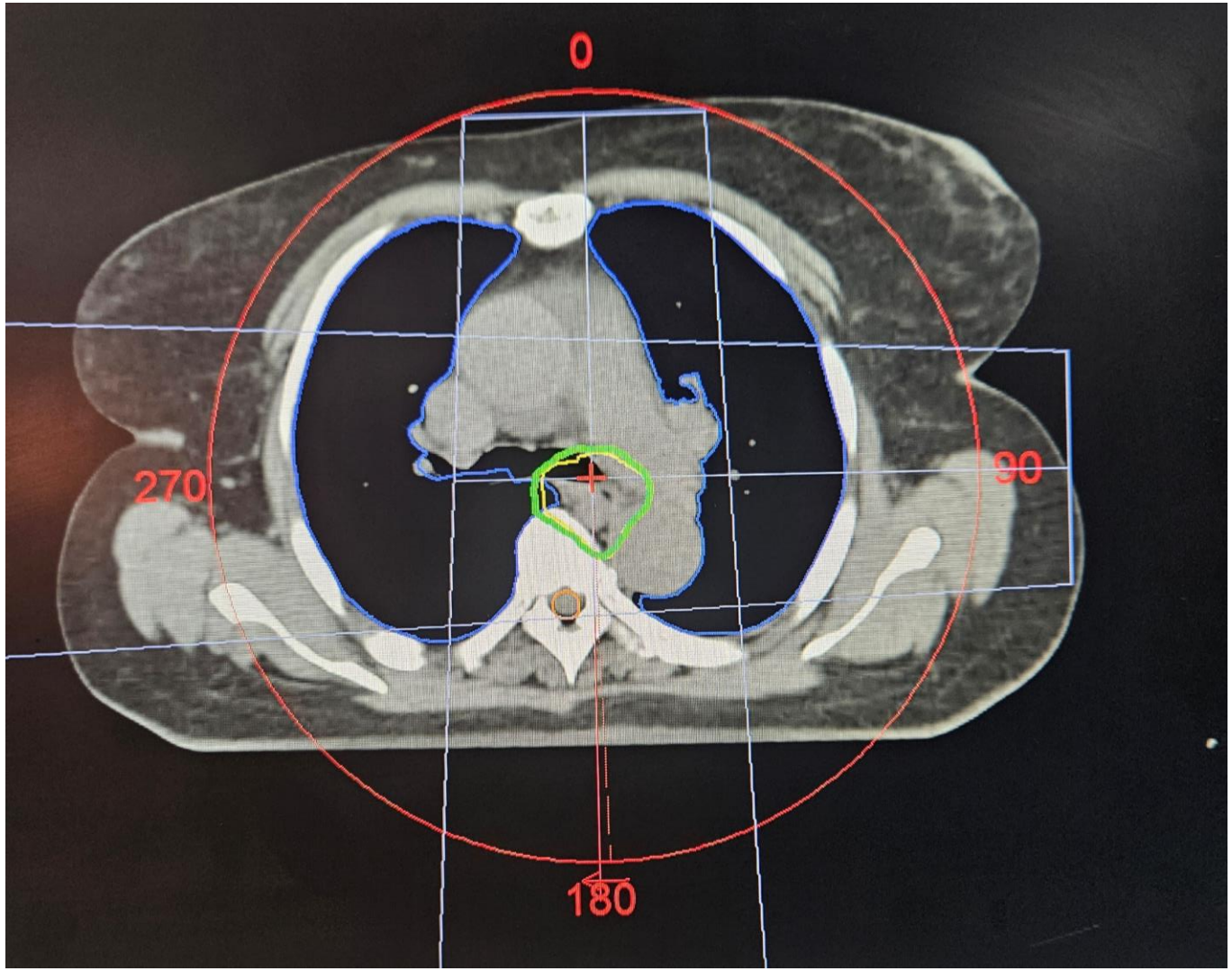




GTV: RED CTV: PINK PTV: YELLOW

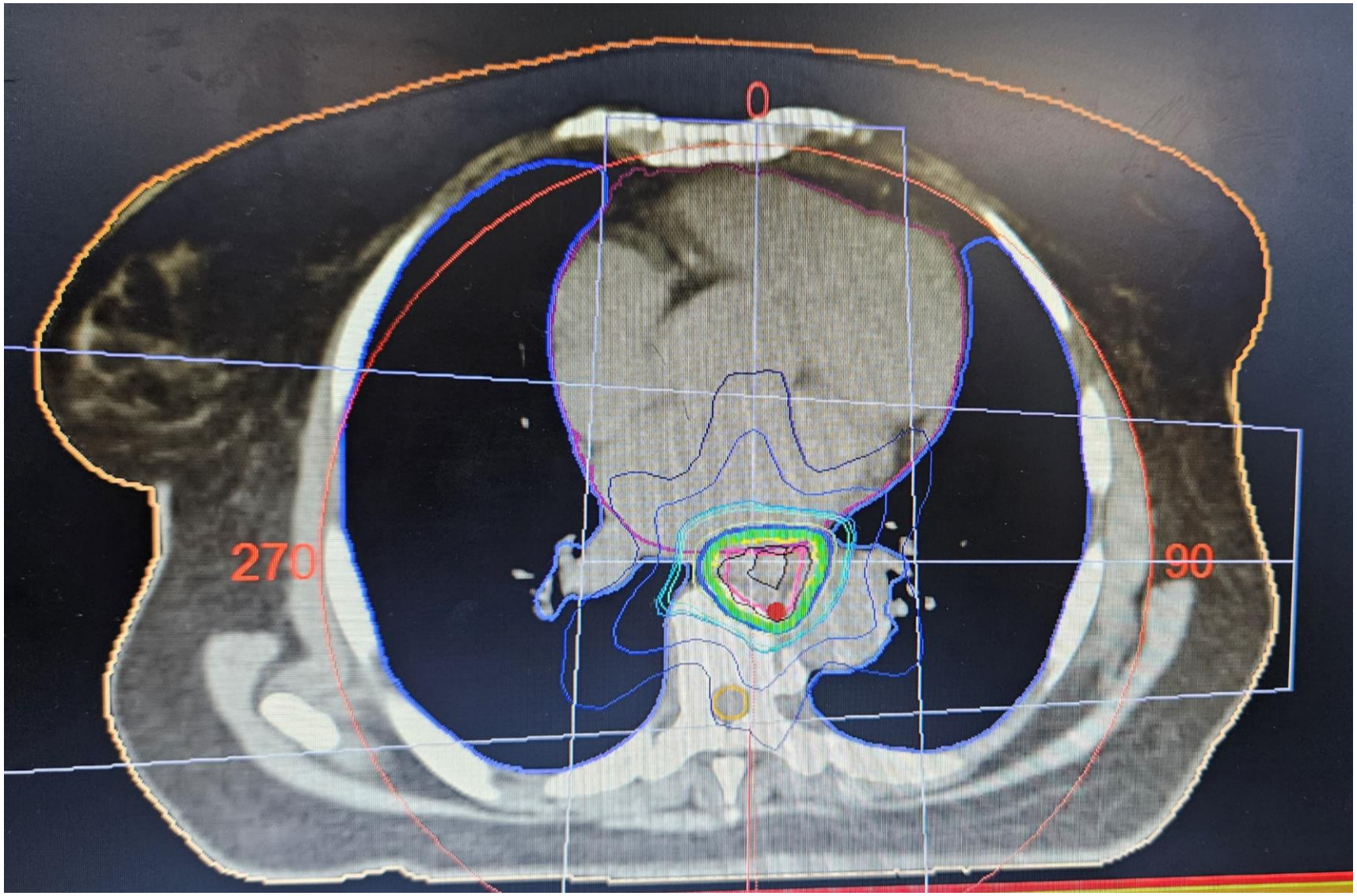
Plan evaluation

- Beam arrangements: VMAT plan with 1 complete arc in clockwise direction



Coverage

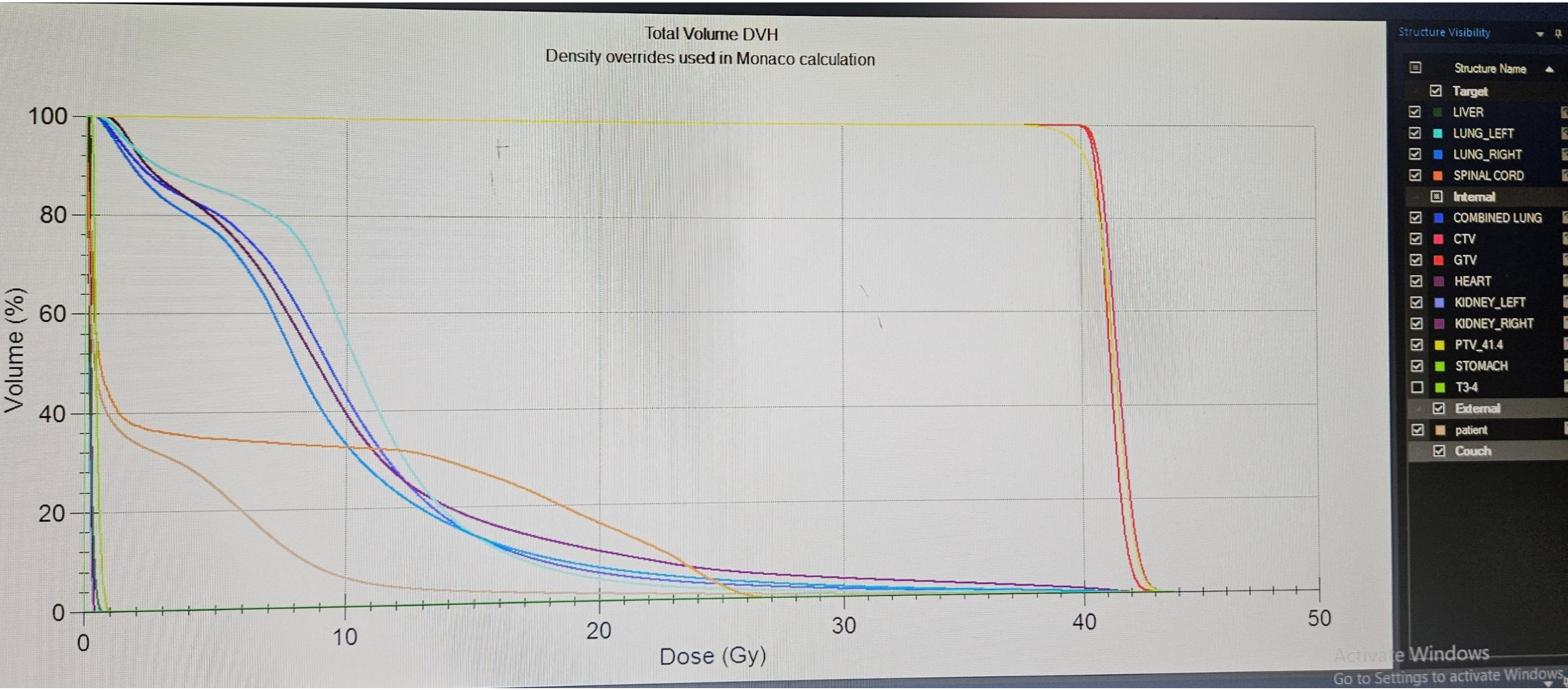
- D95 PTV= 98% (ICRU recommendation 95-107%)
- Dmax=105% (within PTV)



Organs at risk: statistics

Organ	Dose constraint	Actual constraint	Comment
Lung	V40Gy ≤ 10% V30Gy ≤ 15% V20Gy ≤ 20%	V40=0.41% (R) V40=0.2% (L) V30= 2.08% (R) V30=1% (L) V20=6.8% (R) V20=4.4% (L)	Accepted Accepted Accepted
Heart	V30Gy ≤ 30% Mean dose < 26Gy	V30=3.7% MD=10.4Gy	Accepted
Spinal cord	Max Dose ≤ 45Gy	Dmax= 27Gy	Accepted
Kidney	V20Gy ≤ 33% Mean Dose < 18Gy	V20=0% (R) V20=0%(L) MD=0.3Gy (R) MD=0.2Gy (L)	Accepted
Stomach	Mean Dose < 45Gy Max Dose < 54Gy	MD=0.5Gy Dmax=1Gy	Accepted

Dose constraints from: National Comprehensive Cancer Network (NCCN). Esophageal and esophagogastric junction tumours. Available from https://www.nccn.org/professionals/physician_gls/pdf/esophageal.pdf.



DOSE VOLUME HISTOGRAM (DVH)

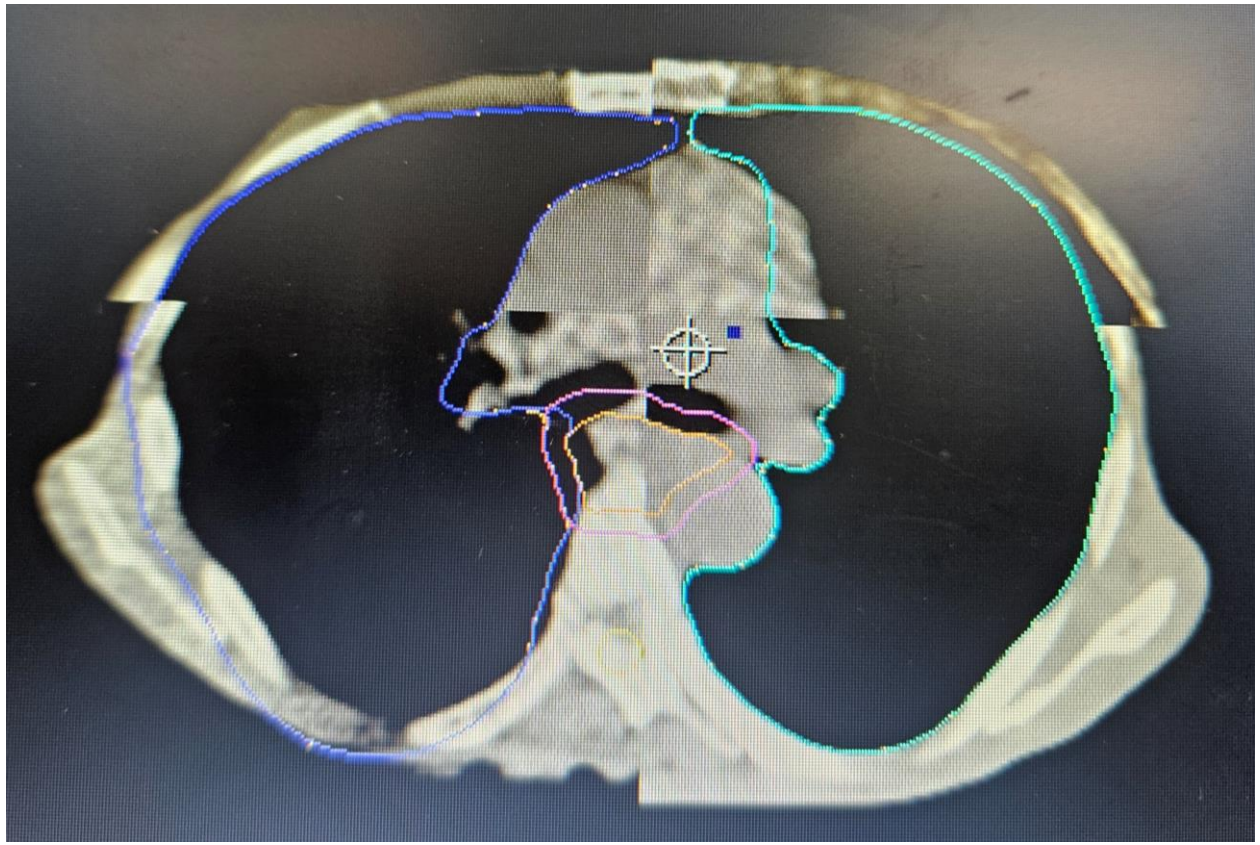
Prescription

1.8Gy daily x 23 fractions → 41.4Gy to PTV

Daily CBCT for first four fractions then weekly

Concurrent chemotherapy (given by medical oncology)

- Carboplatin AUC 2 (120mg) IVI weekly
- Paclitaxel 50mg/m2 (140mg) IVI weekly



Patient tolerated CCRT well with no severe acute toxicity. Reviewed weekly in clinic with FBC/U&E and CMP. No skin reactions noted, dysphagia improving and able to tolerate semi-solid food.

At 16th fraction, urea noted to be 14.4mmol/L and creatinine 162umol/L. Patient complained of persistent vomiting post chemotherapy. Admitted for IV fluids with improvement in U&Es

Patient completed CCRT and re-referred to SOPD for consideration of surgery

Unfortunately, restaging CT displayed features of disease progression with multiple lung metastases. Patient subsequently referred to medical oncology for palliative chemotherapy.

Timelines

- Initial symptoms: February 2023
- Upper scope and biopsy: 11 July 2023
- Staging CT: 11 August 2023
- MDT discussion: 31 August 2023
- Initial consult Radiation Oncology: 04 September 2023
- Treatment: 20 November 2023 – 21 December 2023

Discussion points

- Importance of FDG PET/CT in staging oesophageal cancer and limitations of its use in LMICs
- Delays in patient presentation, workup and treatment in resource constrained setting
- Resectable oesophageal cancer: do patient's make it to resection post neoadjuvant CCRT? Role of dose escalation if patients are inoperable post neoadjuvant CCRT?
- Overall prognosis of “curable” oesophageal cancer especially in LMIC setting

THANK YOU

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