Head and Neck Contouring

AAMD Virtual 45th Annual Meeting
Matthew Taylor, CMD
Upendra Parvathaneni MD, FRANZCR

Disclosures

Upendra Parvathaneni, MD
and Matthew Taylor, CMD

Neither speaker has any disclosures for this presentation
Objectives

- Review anatomy, dose constraints and contouring of:
  - parotid gland
  - sub mandibular gland
  - optic nerve
  - cochlea
Parotid: background

- Major salivary gland
- Paired structure
- Produces serous (watery thin) saliva in response to sight, smell and thought of food
- Saliva reaches mouth via parotid duct near 2nd molar
- Saliva is needed for:
  - tasting food
  - chewing
  - swallowing
  - digestion

- Very sensitive to RT
- Dry mouth (xerostomia) usually within 1-2 weeks of RT
- Recovery after RT over weeks to months
- Long term xerostomia = major detriment to quality of life
- Xerostomia adversely affects:
  - chewing and swallowing
  - taste
  - oral hygiene and dental health
  - nutritional status
Parotid sparing IMRT to reduce Xerostomia is standard of care

- **Goal:**
  - < 26 Gy mean dose to at least 1 parotid
  - No threshold; more sparing = better

[Graph showing NTCP (normal tissue complication probability) vs. mean parotid gland dose (Gy)]

**Parotid: anatomy and contouring**

Ant: Masseter muscle
Post: sternomastoid m
Parotid: anatomy and contouring

Inferior extent

Superior extent

Contouring variations among experts

CT-based delineation of organs at risk in the head and neck region.
DAHANCA, EORTC, GORTEC, HKNPCG, NCIC CTG, NCRI, NRG Oncology and TROG consensus guidelines.
Radiotherapy and Oncology 117 (2015) 83–90
sub mandibular gland

SMG: background

- Major salivary gland
- Paired structure
- Produces mucinous (thick) saliva at baseline + in response to food
- Saliva reaches mouth via Wharton’s duct in floor of mouth

- SMG Saliva is rich in mucins and needed for:
  - wet sensation in mouth – 90% of unstimulated saliva
  - oral and dental health
  - swallowing
SMG: background

- Parotid sparing IMRT is current standard of care
- Parotid sparing IMRT improves salivary flow (objective) and reduces xerostomia
- However, Patient rated xerostomia scores (subjective) are suboptimal
- Advantage of parotid sparing on a 0-100 scale was <10 points at one year!! Parsport study 2011
- There is room for improvement

Submandibular gland sparing IMRT
UW experience

- 76 patients had SMG sparing IMRT
- Mean SMG dose = 30.7 Gy
- Mean parotid dose = 23 Gy
- $Gd^2+$ xerostomia reduced by SMG sparing
  - 6 months: 23% vs. 72%
  - 12 months: 6% vs. 41%
  - 24 months: 3% vs. 36%
  - $p < 0.0007$

Gensheimer et al. Radiation Oncology 2014, 9:255

Mucins from SMG are vital to minimize xerostomia

- $Gd^2+$ xerostomia reduced by SMG sparing

Goal: SMG mean dose of < 39 Gy

24 months: 3% vs. 36%
$p < 0.0007$

Gensheimer et al. Radiation Oncology 2014, 9:255
Reduced PEG duration with SMG sparing IMRT UW experience

SMG spared < 42Gy
1.9 vs. 3.5 mo
PEG dependence

At 6 months:
PEG dependency
3 vs 30%

Saliva is also needed to swallow

Goal: SMG mean dose of < 39 Gy

Gensheimer et al. Radiation Oncology 2016 11:151

SMG: anatomy and contouring
Optic nerve: background

- Cranial nerve II
- Visual pathway: retina -> brain
- Paired structure
- Organ arranged in series – like links of a chain
- Damage to optic nerve = blindness

- Max dose < 54 Gy

Optic Nerve: anatomy and contouring
Cochlea: background

- Organ of hearing, CN VIII -> brain
- Paired structure
- Damage to cochlea = deafness
- Max dose < 35 Gy
Cochlea: anatomy and contouring

Thank you