

The modalities available

- are:
- MV photons
 - KV photons
 - Brachytherapy photons
 - MeV electrons
 - Protons.

My preferred modalities would be MV photons or protons (which are of restricted availability).

MVP is preferred because it has a sharp penumbra (~ 0.5 cm), a skin sparing effect and by the use of multiple beams can avoid damage to OARs. These beams will produce a homogeneous dose distribution.

Protons are preferred for their very sharp penumbra (~ 0.2 cm) with skin sparing. The proton energies can be varied to give a conformal + homogeneous dose distribution by the use of specially fabricated propeller compensators (these spread out the Bragg Peak by selectively removing energy from the beam). For both of these, patient immobilisation is useful to aid accuracy.

Brachytherapy is not preferred because of the difficulty of positioning the catheters. With the dose profile being sharp \propto Inverse square law fall off, slight position changes could either underdose tumour or overdose the brainstem. It's also not preferred because of the difficulty with junctioning neck fields if needed.

Electrons are not preferred because the area is filled \propto bone + air spicules that will produce large dose variations ($\pm 24\%$), because the depth of the clivus is $\sim 7-8\frac{1}{2}$ cm which means ≥ 20 MeV e^- which has high dose construction and low dose bulging, the dose gradient is not fine enough to reduce dose to brainstem, and the beams would need to be

For a tumour in the clivus, planning requires a curative dose to the structure but a low dose to an immediately posterior critical structure (the brainstem) as well as lateral organs (the parotids) and anterior organs (eyes). Considerations should include the possibilities of nodal irradiation also.

Laterals as post will go through critical structure and ant is predominantly air + therefore depth is likely to be into brain stem also. Laterals will give full dose to skin ($\text{since } \geq 20 \text{ MeV } e^-$) and parotids.

KV photons are not preferred because even a 250 kV beam will only deliver 50% (unlike a 6 MV $x = 75\%$), it has no isocentric mounting to permit accurate placement of the beam and moderate isodoses (30-40%) bulge laterally to include the ~~and~~ brainstem. The comments of skin dose and parotid dose apply here also (similar to e^-). Prolonged treatment time is also likely if using multiple beams.

Aug 2. 04 @ ?