**Dental management of patients undergoing radiotherapy and/or chemotherapy**

**Radiotherapy**

The use of ionizing radiation to kill tumor cells which have a higher reproduction rate than normal surrounding cells, making them more vulnerable to such treatment modality. X-rays, gamma rays and neutrons particles are examples for currently used beams in radiotherapy.

**Mechanism:** Radiation ablates unwanted cells either directly or indirectly through the production of free radicles **(H2O2)** which by their way interfere with cellular DNA causing damage. In ideal situations, ionizing radiation destroy neoplastic cells while sparing normal host, however, in practice normal nearby tissue experience some undesirable consequences.

Typically, radiation is given in a daily dosage of **200 centigray** (rad) with exception on altered radiation fractionation schedule. Usually radiotherapy is delivered **5** days in a week with weekend off to allow for normal cell to repair.

**Effects on normal host cell in patients receiving radiotherapy for head and neck malignancy:**

* Mucosal effect include erythema in the first **1-2 weeks** of treatment which may progress to sever mucositis with or without ulceration which is very painful and makes feeding painstakingly. Thin epithelium with less vascular submucosal tissue. Minor trauma may induce ulceration that would takes **weeks or months** to be healed and difficult to be differentiated from secondary malignancy.
* Taste become distorted but recovery takes place after **6 months**.
* Mandibular mobility is reduced during **1st year** post-radiation due pterygomassetric sling fibrosis and trismus.
* Salivary gland epithelium is with slow turnover making the glands somewhat radio-resistant, but damage to fine vasculature resulting in glandular damage with different degree of xerostomia. Dry mouth associated with difficulty in chewing, swallowing, altered sensation, accelerated caries events and periodontal diseases.

**To minimize the discomfort and consequences of xerostomia:**

* Advise to drink much water.
* Avoid cariogenic foods.
* Artificial salivary substitute **(carboxymethylcellulose)**.
* Medications that induce salivation: **prilocaine hydrochloride** (5mg/ 5 times per day) and **cevimeline hydrochloride** (30 mg/3 times per day).
* Bone-related effects: this resulted for progressive endarteritis obliterans and damage to osteocytes. Osteocyte remain alive until when stimulated to divide, at that time they die. The major stimulant for their division is **dental extraction**.
* Other effects include predomination of anaerobic oral flora and candida albicans, necessitating the administration of oral anti-bacterial mouthwash and topical anti-fungal medications.

**Dental management**

1. Any tooth/teeth with questionable outcome should be extracted. Badly carious, large filled, advanced periodontitis and partially impacted teeth should be removed prior the initiation of radiotherapy.
2. No need to extract healthy teeth as this doesn't avoid the establishment of osteoradionecrosis.
3. The extraction should be as atraumatic as possible with removal of any sharp edges that may ulcerate thinned mucosa.
4. All efforts would be done to educate patients about to undergo radiotherapy regarding the importance of good oral hygiene and the undesirable effects of neglecting oral care.
5. Teeth kept in the mouth would be maintained and carefully followed. Topical fluoride application prior, during and after irradiation, any sharp cusp is rounded. Mouth rinse is about **10** times per day with saline and twice a day with chlorhexidine during irradiation period.
6. During radiotherapy, recall visits each week to manage any signs and symptoms of infection, like candidiasis. Mouth opening is also examined, if any limitation is noticed, patients advised to do physiotherapy.
7. Accepted period between extractions and radiotherapy is about **1-2** weeks and if possible to delay the treatment better to be **3** weeks to permit adequate soft tissue healing. Radiotherapy could be started earlier if the extraction site is away from the radiation beam.
8. Completely impacted teeth within bone are better left in place without any treatment.
9. Patients would be seen each **3-4** months post-radiation for follow up, topical fluoride applications, motivation for good oral hygiene and monitoring mouth opening.
10. Caries developed after radiotherapy to be treated by filling and root canal as fast as possible.
11. Post-radiation extraction is favored to be undertaken by oral and maxillofacial surgeon, to perform as atraumatic extraction as possible. Another modality is the administration of hyperbaric oxygen before and after extraction over **4-6** weeks before and **2** weeks after.

**Chemotherapy**

It is a modality for the treatment of malignant lesions using certain medications that are used alone as a curative treatment, preoperatively before surgery to reduce tumor size (neoadjunctive or induction chemotherapy) or postoperatively after surgery to provide more locoregional control over the malignancy (adjunctive). These medications as in radiotherapy are effective against rapidly growing tumors while slower one would resist such treatment.

**Effects of chemotherapy on the host**

* Reduction in the cellular turnover of the oral mucosa leading to thin atrophied epithelium that easy to ulcerate after **1** week from induction. Recovery back to normal happens **3** weeks after cessation of the treatment.
* Bone marrow suppression is a major concern for oral and maxillofacial surgeries. As a side effect on nearly all commonly used agents are neutropenia, thrombocytopenia and anemia which participate to risk of serious infection and bleeding subsequently. Recovery from myelosuppression takes place **3** weeks after cessation of chemotherapy.
* Alteration of the oral microflora contributing to superinfection and opportunistic infection.
* Bone effects that may lead osteochemonecrosis. These outcomes resulted from the uptake of bisphosphonate by the osteoclast which inhibit their resorption capacity with subsequent decrease in bone turnover. Bone became brittle and unable to repair microfracture from daily activities. This is manifested after dental extraction as osteochemonecrosis.

**Dental management**

1. Patients would be seen before the induction of chemotherapy (bisphosphonate) to treat caries, oral infections, extraction of hopeless teeth and fluoride application.
2. It is better to delay chemotherapy **4-6** weeks after dentolaveolar surgery to guarantee adequate bone repair.
3. Regular visits are important for the evaluation of patient's hygiene, early management of caries and defective fillings during chemotherapy cessions.
4. In circumstances where urgent surgery during chemotherapy or shortly after, laboratory investigation for WBC account, platelet account and HB. Neutropenia/ mm3: **1,000 - 1,500** mild, **500 – 1000** moderate or less than **500** severe. No need for prophylactic antibiotic in case of mild neutropenia while it is necessary in moderate and severe and continued **7** days postoperatively. Platelet account below **50,000/**mm3 should be arranged for platelet transfusion to avoid excessive bleeding.
5. Osteochemonecrosis or bisphosphonate associated osteonecrosis of the jaw is noticed to occur in patients taking bisphosphonate for **6** months. Any dental treatment is better provided at a period less than **6** months.