

PROSPECTIVE STUDY TO ASSESS THE INCIDENCE OF OTITIS MEDIA IN PATIENTS RECEIVING CONCURRENT CHEMO-RADIATION FOR HEAD AND NECK MALIGNANCIESMahesh T. Bhat¹, Vani Krishana Gupta², Vinay V. Rao³, Vishak S⁴, Akhilesh P. M⁵**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Radiotherapy-induced ear toxicities remain under-evaluated and under-reported. These reactions may affect all structures of the hearing organ, and can result in conductive hearing loss (CHL) due to development of otitis media. The field of radiation for head and neck malignancies ranges from skull base to thoracic inlet in order to include both the primary tumour and neck nodes. The temporal bone thus becomes a part of the irradiated field. However, the dose of radiation varies depending on the site of primary tumour. Up to 40% of patients have acute middle ear side effects during radical irradiation leading to significant morbidity. **AIM:** To find out the incidence of otitis media with effusion in patients who received concurrent chemo-radiation for head and neck malignancies. **SETTINGS AND DESIGN:** Prospective study conducted in the Department of ENT in a tertiary care centre during a time period from Jan 2014 to June 2014. A total of 50 patients suffering from head and neck malignancies (histologically proven) who were admitted under the departments of ENT or Radiation Oncology were included in the study. **METHODS AND MATERIAL:** 100 ears in 50 radiotherapy – treated patients suffering from head and neck malignancies were assessed. Radiotherapy dose varied between a total of 66 - 70 Gy given as 2Gy/day at five fractions/week and chemotherapy dose of cisplatin 35mg/m² weekly for 6 weeks. CHL was identified by pure tone audiometry and impedance audiometry conducted at regular intervals. The presence of pre-existing and tumour induced hearing loss was taken into consideration. **RESULTS:** Pre- therapy 11(11%) ears were found to have pre-existing OME. On assessment at the end of therapy, 48(48%) ears were found to have OME and 9(18%) of patients had bilateral OME. None of the cases had chronic otitis media. All ears showed CHL and the ones with pre-existing CHL showed further threshold deterioration. **CONCLUSION:** Short term OME following concurrent chemo-radiation (CIRT) in unilateral or bilateral ears leads to CHL. This can contribute significantly to decreased hearing in the patients and lead to further morbidity.

KEYWORDS: Chemo-radiation, otitis media with effusion, pure tone audiometry, impedance, head and neck malignancies.

MESH TERMS: Chemo-radiation; otitis media with effusion; audiometry, pure tone; audiometry, impedance.

INTRODUCTION: The incidence of head and neck cancers in India is on a rise. These tumours are treated either by a single modality or by multimodality treatment regimen. Patients either receive adjuvant CIRT or radical CIRT. The temporal bone is invariably present in the irradiated field, though the dose varies.

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Thus exposing the pharyngeal end of Eustachian tube to high dose of radiation, resulting in significant changes in the external, middle (in the form of OME) and inner ear.^[1]

As a consequence of this secretory otitis media conductive deafness develops. The conductive hearing loss may be transient (as long as effusion is present in the middle ear) or permanent if atrophic otitis media occurs or if necrosis of the auditory ossicles occurs. (With up to approximately 60 dB of CHL). This post-irradiation OME is usually neglected and causes significant hearing loss. If this is not diagnosed and managed adequately, it may lead to atelectasis or suppurative otitis media. Because of the considerable impact on the quality of life in head and neck malignancy survivors, post-irradiation OME deserves more evaluation.

METHODS:

SOURCE OF DATA: All patients suffering from head and neck malignancies proven by histopathology report, admitted under the departments of ENT or Radiation Oncology for radiotherapy or adjuvant CTRT at Father Muller Medical College from Jan 2014 to June 2014, who are willing to undertake an audio logical assessment.

The statistical analysis used was computation of percentages.

SELECTION CRITERIA:

Inclusion Criteria:

- Individuals receiving CTRT for head and neck tumors, where the auditory system is included in the field of radiation.
- Individuals coming for at least 3 months follow up.
- Individuals willing to participate in the study.

Exclusion Criteria:

Individuals who:

- Have congenital hearing loss.
- Have undergone otological surgery in the past.

METHOD OF COLLECTION OF DATA: 50 patients (100 ears) suffering from various head and neck malignancies were enrolled in the study. They received concurrent chemo-radiation at the dose of 66-70 Gy given about 5 days a week. Each daily fraction delivered a dose of 2 Gy for 6 weeks. The chemotherapeutic drug given was cisplatin at dose of 35mg/m² weekly for 6 weeks. Informed consents were taken at the beginning of the study from each patient.

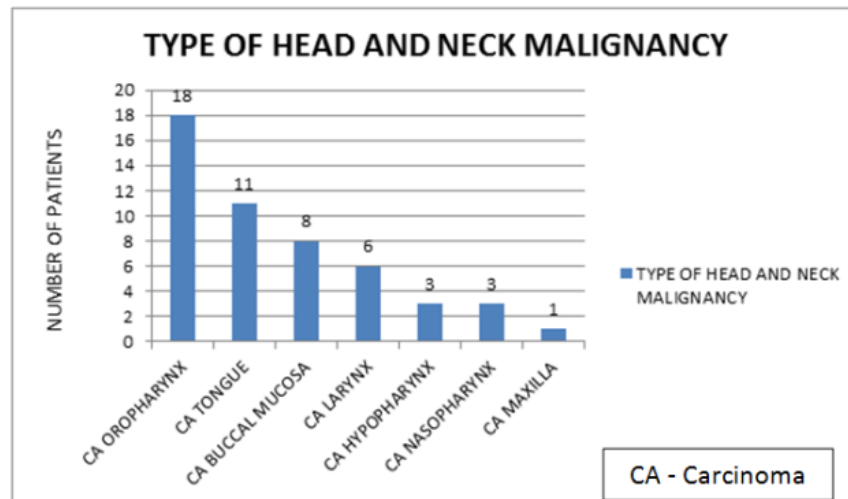
Pre -therapy audiological evaluation was done in the form of pure tone audiometry and emmittance audiometry which consists of impedance audiometry and reflexometry using a 226Hz probe tone. Standardized instruments were used for these tests. The tests were repeated at the end of chemo-radiotherapy and results were computed.

RESULTS: A total of 50 patients (100 ears) suffering from head and neck malignancies were enrolled in this study. The various malignancies that they suffered from are depicted in the graph. There were 7 female and 43 male patients. The mean age was 50.82 years with a range from 12 to 70 years. The mean radiation dose delivered was 68±2 Gy.

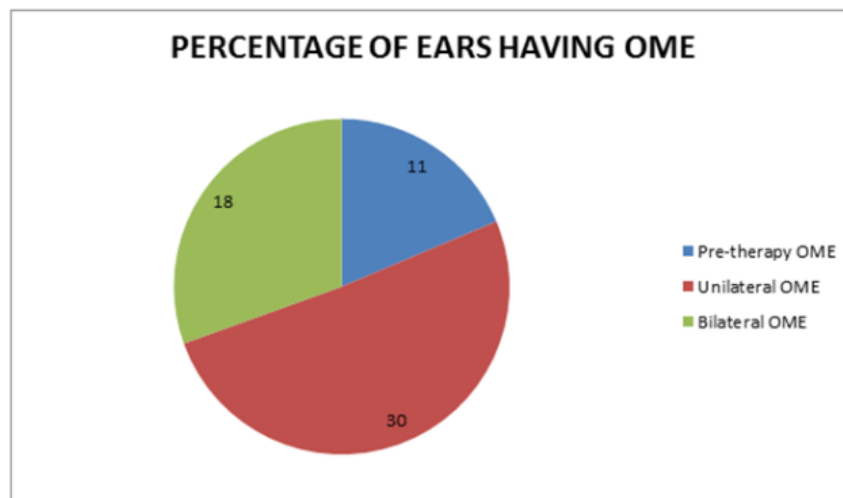
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The dose of chemotherapeutic agent, cisplatin given was 35mg/m² weekly for 6 weeks. All 50 patients received concurrent CRTT though the type of RT differed. 28(56%) of the patients received 2Dimensional RT (2DRT), while 14 (28%) of them received 3DRT and 8 (16%) of them received intensity modulated radiation therapy (IMRT).

Pre-therapy 11ears (11%) suffered from pre-existing OME due to the tumour itself. This was assessed by impedance audiometry. When reassessed at the completion of therapy, 48 ears (48%) were found to have features of OME. Amongst these 9 patients (18ears) had bilateral OME as depicted by the pie chart. None of them progressed to chronic otitis media in the span of our study.



Graph summarizing types of head and neck malignancy



DISCUSSION: OME is the presence of thick and sticky fluid behind the tympanic membrane in the middle ear. It is a common reaction due to transient edema and dysfunction of the Eustachian tube. As a result of which, there is resorption of air by the middle ear mucosa with compromise of pressure equilibration leading to reduced pressure in the middle ear cavity and hence CHL.

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When the function of Eustachian tube doesn't normalize, and middle ear pressure becomes negative enough, there is transudation from the engorged capillaries of the mucous membrane [2].

OME is both an important presenting manifestation of head and neck malignancies and a common otologic complication following chemo-radiation.[3] OME is hence common in both pre-irradiated and post-irradiated head and neck malignancies. Previous studies revealed that mechanical obstruction of Eustachian tube orifice and tumour invasion of the surrounding muscles cause OME in the pre-irradiated patients.[4,5]

The possible etiologies of post-irradiated OME include decreased mucociliary function of the Eustachian tube, fibrosis of tensor veli palatine muscle, scarring of Eustachian tube opening or poor nasopharyngeal hygiene.[6,7] In a study by Morton et al.[8] 26% of their patients developed OME after RT. In another study done by Kai-Li Liang et al.[9] 52.9 % of the patients presented with OME and 18.8 % had chronic discharging ears after a mean follow-up of 842.1± 49.0 days from the completion of RT.

There is a similar incidence of post-irradiated OME in our patients. Reports on radiotherapy-induced ear toxicities, however, often have to deal with a number of difficulties or limitations, such as small or heterogenous patient populations, a short follow-up period, or inability to verify the diagnosis of by tympanocentesis or myringotomy. We faced a similar situation as long term follow up of these patients was difficult.

Radiation to the temporal bone causes various morbidities pertaining to the ear, particularly when delivered by conventional 2DRT. Even though modern radiotherapy techniques are considered Preventive measures for radiotherapy-induced ototoxicities, both previous and current studies showed no beneficial effect on the occurrence of post-irradiation OME.[10]

To combat this situation, a screening audiological assessment would be helpful to know the pre-therapy status of the ear. Also post therapy significant middle ear changes, can be treated either medically, by use of anti-histaminics and decongestants or surgically by grommet insertion, if required. This approach can not only relieve pain but improve the hearing in these patients.[11]

CONCLUSION: Radiotherapy for the head and neck area is associated with an increased risk of early and late radiation-related ear toxicity. Amongst these OME can be seen as early as 3 months post-irradiation. Due to its relatively high frequency, and significant morbidity caused by it, these sequelae should attract more attention. An attempt should be undertaken to prevent, diagnose and effectively treat early and late ear morbidity.

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