Case Report:

Aspiration from Delayed Radiation Fibrosis of the Neck

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Abstract. An unusual case of delayed severe fibrosis of the soft tissues of the neck following radiation therapy for squamous cell carcinoma of the oropharynx resulting in dysphagia and recurrent aspiration is reported. The patient’s case history, radiographic findings, and speech-language pathologic evaluation are presented.

Key words: Aspiration—Radiation fibrosis—Squamous cell carcinoma—Cinepharyngoesophageogram—Deglutition—Deglutition disorders.

Most complications following radiation therapy for squamous cell carcinoma of the upper digestive tract occur within 1 year of treatment. Very late complications of radiotherapy for treatment of such cancers, however, have been reported [1–3]. These rare complications include osteoradionecrosis, fistula formation, fibrosis, glottic incompetence with aspiration, and stenosis. Such complications have occurred as late as 25 years following treatment [4]. With modern refined techniques of radiation therapy, severe late complications of radiation therapy are now uncommon.

Late radiation-induced injury is most likely related to injury to blood vessels, particularly the microcirculation, which results in a progressive decrease in blood flow to tissues and, in turn, tissue injury and fibrosis. This adverse effect may continue for many years following treatment [5].

Adverse factors responsible for complications due to radiation therapy include high total radiation dose, large field size, and short treatment time, in addition to the normal tissue tolerance within the treatment field [6]. Interstitial radiation treatment usually results in fewer complications than does external beam radiation therapy.

Kapur reported the late development of dysphagia and cervical esophageal obstruction due to severe fibrosis 21 years following external beam radiation therapy after thyroidectomy for the treatment of thyroid carcinoma [1]. Pathologic evaluation of the periesophageal tissues revealed dense acellular fibrous tissue with fibroblast proliferation [1].

Case Report

History and Physical Examination

A 67-year-old man presented with dysphagia, cough with swallowing, and recurrent pneumonia. The patient had received pri-
Fig. 1. *Lateral view of the neck.* Note mandibular defect, hyoid elevation, and laryngeal rotation.

Fig. 2. *Cinepharyngoesophagram, lateral view.* Contrast is retained in vallecula and penetrates the larynx.

Fig. 3. *Cinepharyngoesophagram, anteroposterior view.* Contrast is retained in pyriform sinuses. The pharyngoesophageal segment is deviated to the right and laryngeal penetration is seen.

Primary radiation therapy for squamous cell carcinoma of the right base of tongue (staged as T2 N2 M0) 10 years before. Radiation treatments consisted of 4 MEV photon therapy with a midline tumor dose of 60.66 Gy and 43.93 Gy to the right neck and 44.36 Gy to the left neck. Interstitial implants of iridium 192 seeds to the base of tongue gave an additional boost of 23.87 Gy to the primary tumor. An ipsilateral radical neck dissection was performed following radiation therapy because of persistent cervical metastases.

The patient's postradiation and postsurgical course was complicated by osteoradionecrosis of the body of the mandible with subsequent sequestration of bone, pathologic fracture, and development of an orocutaneous fistula despite hyperbaric oxygen treatments. Antibiotics and wound care were given. The fistula closed, a fibrous union of the mandible occurred, and the oral cavity healed. Following the creation of dental restorations, the patient tolerated a regular diet. Regular follow-up examinations revealed no evidence of tumor recurrence.

The patient did well until approximately 9 years following his tumor treatment when he experienced dysphagia with coughing during and after most meals and recurrent pneumonia. After a barium swallow documented aspiration, a gastrostomy tube was placed and oral intake was eliminated except for ice chips. Despite this restriction, aspiration pneumonia continued.

Physical examination revealed a bony defect of the right mandibular body with surgical scars of the right neck and diffuse moderate fibrosis of the neck with laryngeal fixation. Tongue protrusion was limited. Fiberoptic laryngoscopy revealed supraglottic pooling of secretions, with normal vocal cord motion bilaterally.

Direct laryngoscopy and an examination under anesthesia showed no evidence of recurrent tumor.

**Radiographic Evaluation**

Radiographic findings were significant for mandibular defect, reduced hyoid elevation, and laryngeal rotation (Fig. 1). Marked oral and pharyngeal dysfunction with decreased oral control and pharyngeal paresis or scarring was present. Moderate retention of contrast was noted in the valleculae and pyriform sinuses after swallowing (Figs. 2 and 3). There was laryngeal penetration and aspiration even when the supraglottic swallow technique was used. The larynx was fixed without epiglottic tilt and the pharyngoesophageal segment deviated to the right. Aspiration of retained contrast after swallowing occurred. No reflexive cough occurred upon laryngeal penetration and the airway was not cleared with a volitional cough.

**Speech-Language Pathology Evaluation**

Swallowing evaluation by a speech-language pathologist was performed in conjunction with the cine swallowing study. Cognition was normal and labial function was intact. Lingual function was