J Oral Maxillofac Surg
64:4-11, 2006

Neck Dissections for Oral/Head and Neck Cancer: 1906–2006

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In 1906 a frequently quoted paper was published in the *Journal of the American Medical Association* by Dr George Crile (Fig 1) of the Cleveland Clinic in Ohio.[1] The article was entitled "Excision of Cancer of the Head and Neck – With Special Reference to the Plan of Dissection Based on One Hundred and Thirty-Two Operations." While not his first paper on this subject, this is nonetheless the most often referenced paper of Dr Crile's many works. Early in the introduction of his 1906 paper, Crile lamented that the treatment of cancer of the head and neck had not received the attention of nor kept the pace of progress in other surgical disciplines. He astutely identified that the immediate extension from the primary malignant focus principally occurred by permeation and metastasis in the regional lymphatics. As such, Crile reported on his recommendations for the best method of "surgical attack" by stating that an incomplete operation would lead to dissemination of disease, stimulate the growth of the cancer, shorten the patient's life, and diminish comfort. He emphasized that isolated excision of the primary focus of the cancer was "as unsurgical as excision of a breast" in the case where the regional lymph nodes remained unaddressed. Further, he indicated that excision of individual lymphatic glands, "as one would excise a tuberculous gland" not only would not result in cure of the patient, but would rather be followed by greater dissemination and more rapid growth. He emphasized that a block dissection of the regional lymphatics and the primary malignancy was necessary, therefore, for effective treatment of these patients. This block dissection included lymph nodes in levels I–V of the neck (Table 1), the sternocleidomastoid muscle (SCM), the internal jugular vein (IJV), and the spinal accessory nerve. This treatment was indicated in the management of patients in whom lymph nodes were enlarged (N+ neck) as well as in those patients whose lymph nodes were not clinically enlarged (N0 neck). While Crile's comments were directed to head and neck cancer as a whole, oral cavity cancers represented only a minority, including 4 cases of floor of the mouth cancer, 1 soft palate cancer, 2 alveolar ridge cancers, and 12 cancers of the tongue. This notwithstanding, this paper also served as a model for treatment of the neck in patients with oral cancer. Interestingly, the most common cancer treated by Crile in his report of 132 cancers was that of the lips, accounting for 31 of these cases. Ironically, by 2006 standards, no doubt many of these lip cancers could have been managed without neck treatment. Further, while the often-quoted theme of Crile's paper was radical neck dissection (RND), only 36 patients underwent such treatment in his report. In these cases, he indicated that a tracheostomy was "doubly indicated" as aside from the short circuiting of respiration and fixing the trachea, it produced a wall of protective granulations across the top of the dangerous mediastinal area. Dr Crile's paper represented the landmark article regarding neck dissections for head and neck cancer until Dr Hayes Martin (Fig 2) published his paper entitled "Neck Dissection"[2] in 1951. This extensive review commented on an experience of 1,450 neck dissections performed from 1928 to 1950, although statistics were derived from 665 operations performed in 599 patients. Dr Martin did not believe that a routine prophylactic RND was practical in managing patients with cancer of the tongue and lip and presented data from a survey sent to 75 of his colleagues, the consensus of which supported his contentions. His conclusion with regard to RND was that routine prophylactic neck dissection was considered "illogical and unacceptable" for cancer of the oral cavity. He made these comments due to his thoughts about oncologic safety and not about functional consequences, stating that no one could carry out prophylactic neck dissection to a degree sufficient to effect significant

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0278-2391/06/6401-0003$32.00/0
doi:10.1016/j.joms.2005.09.025

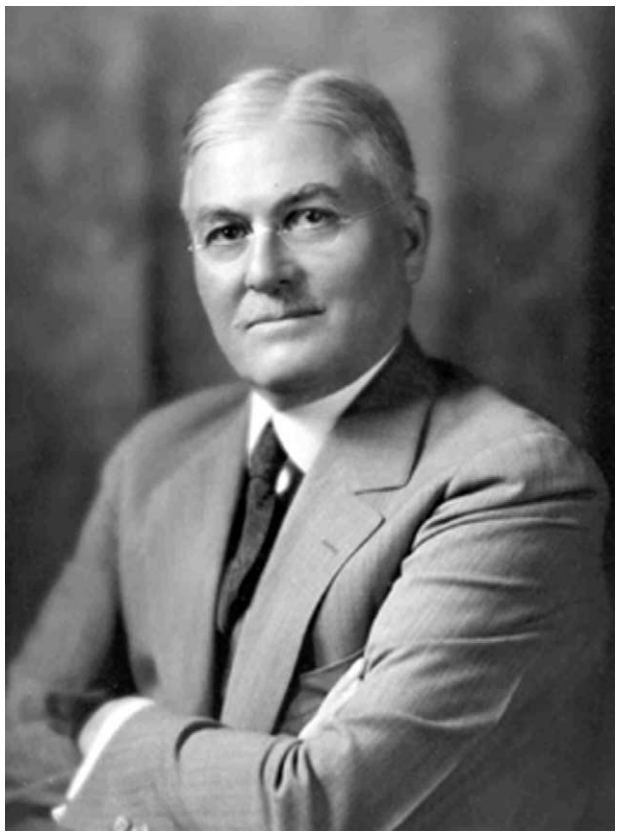

FIGURE 1. George Crile (1864–1943).

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improvements in cure rates. He believed that the RND was too radical a technique for elective use. In other words, the RND should not be used for the N0 neck, a philosophy that is largely observed in 2006. With regard to the elective neck dissection, Martin reported that this concept was not practiced on the Head and Neck Service of Memorial Hospital at the time. Rather, he believed that definite clinical evidence that cancer was present in the lymph nodes represented 1 criterion for neck dissection.

While the RND has proved to be a reliable method of treating patients with head and neck cancer, it is associated with substantial morbidity. Nahum et al[3] described a syndrome of pain and decreased range of abduction in the shoulder following RND. This has been referred to as shoulder syndrome and relates to the sacrifice of the spinal accessory nerve. It has been shown that preservation of the spinal accessory nerve during neck dissection ameliorates the syndrome.[4] The morbidity of the RND, therefore, gave way to the development of the numerous modifications of the RND that maintain oncologic safety while also reducing morbidity of the RND. These modifications of the RND were designed so as to preserve 1 or more of the sternocleidomastoid muscle, spinal accessory nerve, and internal jugular vein.

Table 1. LYMPH NODE LEVELS WITHIN THE NECK AS THEY PERTAIN TO ORAL CAVITY CANCERS

Lymph Node Group	Description
IA (submental)	Lymph nodes within the triangular boundary of the anterior belly of the digastric muscles and the hyoid bone.
IB (submandibular)	Lymph nodes within the boundaries of the anterior belly of the digastric muscle and the stylohyoid muscle and the inferior border of the mandible.
IIA and IIB (upper jugular)	Lymph nodes located around the upper third of the internal jugular vein and the adjacent spinal accessory nerve. Level IIA lymph nodes are located anterior (medial) to the spinal accessory nerve. Level IIB lymph nodes are located posterior (lateral) to the spinal accessory nerve.
III (middle jugular)	Lymph nodes located around the middle third of the internal jugular vein. These nodes are located between the inferior border of the hyoid bone and the inferior border of the cricoid cartilage.
IV (lower jugular)	Lymph nodes located around the lower third of the internal jugular vein. These nodes extend from the inferior border of the cricoid cartilage to the clavicle.
V (posterior triangle)	Lymph nodes located along the lower half of the spinal accessory nerve and the transverse cervical artery. The supraclavicular nodes are located in this group of lymph nodes.
VI (central compartment)	Lymph nodes in the prelaryngeal, pre-tracheal, paratracheal, and tracheoesophageal regions. Boundaries are from the hyoid bone superiorly to the suprasternal notch inferiorly and between the medial borders of the carotid sheaths bilaterally.
VII (superior mediastinal)	Lymph nodes in the superior mediastinum between the suprasternal notch to the innominate artery.

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