AMORE (Ablative surgery, MOulage technique brachytherapy and REconstruction) for childhood head and neck rhabdomyosarcoma
Buwalda, J.

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Addendum
Chapter 1

Figure 1. Embryonal rhabdomyosarcoma. Hematoxylin-Eosin staining. Myxoid background in which loosely textured small cells and primitive spindle-cells with an eccentrically placed nucleus and unipolar cytoplasmic extensions, varying in size. (Courtesy: Dr. J. Bras, Dept. of Pathology, Academic Medical Center)

Figure 2. Embryonal rhabdomyosarcoma, botryoid subtype. Hematoxylin-Eosin staining. Polypoid and myxoid appearance with a subepithelial 'cambium layer', defined as a condensation of tumor cells separated from an intact epithelial surface by a zone of loose stroma. (Courtesy: Dr. J. Bras, Dept. of Pathology, Academic Medical Center)

Figure 3. Embryonal rhabdomyosarcoma, spindle-cell type, at low (A) and high (B) magnification. Hematoxylin-Eosin staining. Relatively uniform long, spindle shaped cells with a slender to ovoid nucleus, arranged in an irregular fascicular, sometimes storiform pattern. (Courtesy: Dr. J. Bras, Dept. of Pathology, Academic Medical Center)

Figure 4. Alveolar rhabdomyosarcoma at low (A) and high (B) magnification. Hematoxylin-Eosin staining. Small cell aggregates with loss of cellular cohesion, resulting in an alveolar pattern. High magnification shows delicate fibrous septa, lined by a single row of undifferentiated cells with a small unipolar cytoplasmatic extension. (Courtesy: Dr. J. Bras, Dept. of Pathology, Academic Medical Center)
Color illustrations

**Figure 6.** Rhabdomyosarcoma. Cytology, showing small cells with an eccentrically placed nucleus and unipolar cytoplasmatic extensions (A, Giemsa staining). The tumor cells express desmin (B, Desmin staining).

**Figure 8.** Patient (18 yrs) after external beam irradiation (at age 2 yrs) of a RMS in the left parotid region. (published with permission of the patient)
Figure 2. Submandibular approach for a RMS of the right parapharyngeal space. After posterior retraction of the sternocleidomastoid muscle and elevation of the skin/plastysma flap, the posterior belly of the digastric muscle, nn. X, XI, XII and internal jugular vein can be identified. By pulling the mandible anteriorly, the tumor (arrow) in the parapharyngeal space can be reached medial to the digastric muscle and the great vessels.

Figure 3. Parotidectomy-approach to a RMS in the right infratemporal fossa. In this patient a total conservative parotidectomy and partial mandibulectomy (because of destruction of cortical bone) have been performed. The two major branches of the facial nerve have been identified and the parotid gland is pulled anteriorly to reach the infratemporal fossa.

Figure 4. Trans-antral approach for a RMS in the right pterygopalatine fossa. The mucosa and peristium are incised in the buccogingival fold and access is gained to the antrum of the maxillary sinus (above the level of the permanent teeth). After removal of the posterior sinus wall, the pterygopalatine fossa is reached.

Figure 11. CT scan image at PDR brachytherapy treatment planning. The residual tumor mass in the parapharyngeal space has been removed and the Gutta Percha mould is in situ. The mould is loaded with dummies and dose distribution is calculated. Reference isodose lines (cGy/h) around the mould are depicted in color: green line 80 cGy/h, outer yellow line 100 cGy/h, inner yellow line 125 cGy/h, light blue line 156 cGy/h.
Figure 5. Moulds 'in situ'. The composition of the several parts exactly fits the surgical defect, ensuring an adequate dose distribution to the target area.

Figure 6. The separate parts which together constitute the mould. Hollow flexible polyethylene catheters are 'sandwiched' between two layers of Gutta Percha. The catheters are either bent together towards the top of the mould or protrude from the mould to ensure an adequate dose (arrows).

Figure 7. Situation after closure of an extended parotidectomy incision. The catheters protrude from the wound and can be afterloaded with Iridium$^{192}$ wire sources.

Figure 10. Patient (8 years of age) at the radiotherapy ward, connected to the microselectron-LDR for afterloading low dose rate brachytherapy.

Figure 9A

Computer-aided two-dimensional calculation of the distribution of the radiation dose. Isodose curves (in cGy/h) are drawn around the sources.
Figure 2. Computed tomography (CT) scan image at brachytherapy treatment planning. The residual tumor mass is removed and the gutta percha moulage is in situ. The moulage is loaded with dummies and the dose distribution is calculated. Reference isodose lines (cGy/h) are depicted in color: green line 80 cGy/h, outer yellow line 100 cGy/h, inner yellow line 125 cGy/h, light blue line 156 cGy/h, dark blue lines 250 cGy/h.

Figure 2. Computed tomography (CT) scan image in the axial plane. The moulage has been introduced into the surgical cavity (patient 5). The sources have been identified and dose distribution is calculated. Reference isodose lines (cGy/h) are depicted in color. Each color corresponds with a different doserate, ranging from 200 cGy/h (inner green line) to 50 cGy/h (outer green line).
Chapter 5

Figure 1. Graphic representation of the 14 measurements used for quantification of the craniofacial skeleton (patient 5). Five measurements were performed on axial CT slices at the level of the orbit (fig. 1a, b) and midface (fig. 1c). Nine measurements were carried out on three dimensional reconstructions of the orbit and midface in anteroposterior view (fig. 1d), the midface in inferior view (fig. 1e) and the mandible in lateral (fig. 1f, g), oblique (fig. 1h) and anteroposterior view (fig. 1i). See Table 1 for description of the 14 measurements.
Figure 3. Patient with an asymmetric appearance of the craniofacial skeleton at clinical assessment. In this patient (patient 7), a hemimaxillectomy was performed as a part of the AMORE procedure at 1.2 years of age. Clinical assessment after 9 years of follow-up revealed an inferior position of the left eye and auricle, a deviation of the bony and cartilaginous nasal pyramid, growth retardation of the midface and mandible and maldevelopment of the teeth. (published with permission of the patient)