Periorbital fascia, its significance in total maxillectomy

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Abstract

In the surgical management of T3–T4 carcinoma of the maxillary antrum, involvement of the roof and/or erosion of the orbital floor, raises the possibility of the sacrifice of the orbital contents. While it is evident that the eyeball has to be sacrificed in the presence of gross disease, the indications when it can be preserved are not clear. Radiological assessment requires a minimum thickness of 4mm of the tissue. Standard anatomical texts describe the bony orbital floor and the orbital periosteum. In 1998 this author for the first time described a distinct fascial layer which encapsulates the orbital fat and termed it Periorbital Fascia. The purpose of this article is to draw attention to this anatomical structure and discuss the precise indications when the eyeball may be sacrificed or preserved. The conclusions are based on the experience with eighty two total maxillectomies for cancer performed over a period of 30 years. In the opinion of this author the following conclusions can be drawn. First, the orbital fat does not rest on the orbital periosteum as shown in anatomical texts, but is enclosed in a thin independent fascial layer termed the periorbital fascia. Secondly, in the event of malignant disease eroding the orbital roof, what is crucial is to know whether the orbital periosteum is involved and to know as to whether the disease process has reached the orbital surface of the periosteum. In case the disease is limited to the under surface of the orbital periosteum, the eyeball may still be preserved by a careful dissection between the periosteum and the periorbital fascia.

Keywords Carcinoma maxillary sinus eyeball · Periorbital Fascia.

Introduction

Sacrifice of the eyeball has serious physical, cosmetic and psychosocial consequences for an individual. While this is sometimes necessary to save life, the indications to do so have in the past not been clear.

The surgeon while desirous of preserving the eyeball is often rightly fearful of either leaving disease behind or worse a recurrence. It is therefore essential to have a clear concept based on facts of surgical anatomy and pathology.

Material and methods

This article is the result of studies in surgical anatomy and surgical pathology, based on 82 maxillectomies for malignant disease performed during a period of 30 years. These procedures were performed at The Free University Hospital Amsterdam between 1979 and 1999 and thereafter at the Bangalore Institute of Oncology between the years 2000 and 2009.

During these surgical procedures it was observed that apart from the orbital periosteum which was closely

adherent to the floor of the orbit there was a thin fascial layer supporting the periocular fat (Fig. 1). This fascia was a distinct separate entity and could be dissected free from the periosteum. Whenever the eyeball was sacrificed it was sent for histopathological examination. However retrospectively it appeared that only when the specimen consisted of the maxilla along with the orbital contents as one piece were the orbital contents subjected to histopathological examination by the pathologist.

All patients with T3–T4 carcinoma of the maxillary antrum underwent CT and or MRI Scan. While CT Scan was valuable to see any bony erosion it was occasionally felt necessary to supplement this with MRI examination to exclude soft tissue infiltration. This was especially useful to detect the involvement of the orbital periosteum.

Results

These can be discussed as follows. First, during surgical intervention with the exclusion of patients with macroscopic tumor extension into the orbit, which was uncommon and where a preoperative decision to sacrifice the orbital contents was already made, in all other cases no disease was seen on the orbital surface of the periosteum.

The periorbital fascia i.e. the fascial layer encapsulating the orbital fat was free of disease in all cases. This was irrespective of the CT/MRI findings showing erosion of roof of the antrum.

Secondly histopathological examination of enbloc surgical specimens where the orbital contents were removed showed involvement of the orbital contents only in one of the six examined cases. In another five specimens where the orbital contents were not removed enbloc no histopathological examination of the orbital contents was carried out.

Lastly all patients were followed up for a minimum of 4 to a maximum of 11 years. With the exception of one case no recurrence was noted.

Fig. 1 Vertical cross section through orbit (diagramatic) showing the periorbital fascial Layer.

Recurrence was encountered in one patient from Bangalore. Retrospective search for the possible cause revealed that during the post operative radiotherapy, the orbit had not been included in the field. In another case recurrence occurred at the infratemporal fossa. This was prior to the introduction of transmandibular approach to total Maxillectomy.¹

Discussion

The consistent finding of the periorbital fascial layer supporting the periocular fat in all cases of total maxillectomy carried out by the author inspired to look into the clinical and anatomical texts. An extensive search into the anatomical literature failed to find any description of such a structure.^{2–6} In a discussion with ophthalmological colleagues it turned out that an ophthalmologist had described the presence of septa through the periocular fat.⁷ Attempts to discuss this finding further brought this author to Birmingham England to the annual meeting of the Association of Clinical Anatomists of Great Britain in 1995, where this paper was presented. There was unequivocal support for this observation by all members of the organization. Subsequently a presentation at the 4th International Conference of Head and Neck Cancer in 1996 at Toronto similar support was forthcoming. The findings have since been recognised in the literature.^{8,9}

The inability to accurately state the presence or otherwise of disease through the orbital periosteum and more so the involvement of the periorbital fascia makes it difficult for the surgeon to state categorically whether the orbital contents will or will not be sacrificed at surgery. Intra operative decision is therefore mandatory and patients and family have to be well informed prior to

Fig. 2 Intraoperative picture of a patient after total Maxillectomy with sacrifice of the orbital periosteum. Note, the eyeball is supported with the orbital fat by the periorbital fascia. (with kind permission of John Wiley & sons, Inc.)

surgery. This has been the authors practice for more then 20 years.

In clinical practice whenever there is doubt about the involvement of the roof of the maxillary sinus, the surgeon is faced with the question; is the orbit involved? And should the eye be sacrificed? In the past the decision to sacrifice the eyeball was not always discussed and debated. However there has been growing conciousness amongst surgical oncologists on this issue and today surgeons like to have a clear policy before undertaking an ablative procedure. There is growing awareness of the psychological trauma caused by the loss of the eye in an individual already suffering from anxiety and depression because of the disease.

Several authors have drawn attention to this fact.^{10–12} However, the process of decision making depends to a large extent on the radiological assessment. In several instances these may not be clearcut and the surgeon has to use his clinical judgment.

In a period of 20 years from 1975 to 1995 118 maxillectomies were performed at the department of otolaryngology Head and Neck surgery of Free University Hospital of Amsterdam. 44 of these were total maxillectomies. Subsequently a number of these procedures were performed until August 1999. For want of long term follow up these have not been included in the report. In the period from 2000 till 2008 an additional 39 total maxil-

lectomies for carcinoma have been carried out at The Bangalore Institute of Oncology.

The report of the existence of a distinct fascial layer supporting the orbital fat added to our knowledge. The policy followed by the author since then has been to discuss the radiological findings personally and in detail with the radiologist and as far as possible not by phone. Subsequently we discuss it with the patient and his family. When the orbital periosteum is not involved, a finding not easily recognised on scans, it has been the authors practice to reassure the patient that in all probability the eye may be saved, this despite the involvement of the roof of antrum. In the event of involvement of the orbital periosteum, the decision to save the eye or otherwise has to be intra operative and this has to be discussed with the patient and his/her family and written consent obtained.

Irradiation of the disease is of paramount importance and should not be compromised. Absence of involvement of the orbital periosteum on the ocular surface provides an opportunity to dissect the periorbital fascia free (Fig. 2). Close follow up is imperative. These patients need post operative radiotherapy because of the initial stage. Some may suffer from epiphora and a small percentage may develop radiation induced cataract. The fact that they have an intact eyeball goes a long way to maintain psychological equilibrium and social image.

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