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Histopathology Findings following Retinal Tack Implantation (With 1 color plate)

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Key Words

Retinal tack
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Retinal detachment
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Abstract

For the first time this report describes the histopathological findings 2 months after **retinal-tack** implantation in a human eye. A **stainless-steel** tack was implanted to seal a small retinal tear during vitrectomy because of severe proliferative diabetic retinopathy in a 38-year-old man. By gross examination the enucleated eye showed a total retinal detachment except at the site where the tack had been implanted. Histologically a fibrovascular tissue proliferation arising from the choroid had grown into the adjacent retina at the tack site. No inflammatory reaction, pigment epithelium proliferation or **glial-cell** proliferation attributable to the tack were observed.

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Introduction

In 1982, Ando and Kondo [3] described the use of plastic tacks in reattachment surgery for permanent fixation of inverted giant retinal tears in 3 patients. Their report stimulated de Juan et al. [6] to develop retinal tacks made of stainless steel and to develop an applicator used for tack introduction, placement and removal. They used this technique in 41 consecutive cases of complicated retinal detachment [7].

Titanium tacks were used by Abrams et al. [1] in 11 surgical procedures on 10 eyes showing complicated retinal detachments following experimental testing of titanium tacks in rabbit eyes [4]. For the first time this report describes the histopathological findings after tack implantation in a human eye.

Material and Methods

Clinical History

A 38-year-old patient who presented first at the age of 22 with a type I diabetes suffered from proliferative retinopathy and vitreous hemorrhage. Panretinal laser coagulation had been performed in both eyes 5 years ago. Due to vitreous hemorrhage vitrectomy was per-

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formed on the right eye in August 1987. A second vit-rectomy became necessary in October 1987 following another hemorrhage. During the same procedure an extracapsular cataract extraction was performed, and a small retinal tear nasally to the papilla was sealed by implantation of a stainless-steel tack. The retinal reattachment was achieved by silicone oil injection.

Macroscopic Preparation

The right globe measured $26 \times 24 \times 27$ mm in size (w $\times$ h $\times$ d) and was fixated for 6 days in phosphate-buffered 4% formaldehyde solution. The globe was dissected horizontally and showed a total retinal detachment except at the site where the tack had been implanted. Subretinally there was abundant silicone oil and exsudate (fig. 1).

Microscopic Examination

The medial segment of the eye was embedded in paraffin for serial sectioning. When reaching the tack it was dissected from the block, to proceed with the encountered serial sectioning. In the microscopic examination, the stained specimen (HE, PAS, Lillie's method for ferrous iron) revealed the following pathological changes: bullous keratopathy, rubeosis iridis with secondary closed-angle glaucoma, bleeding into the anterior and posterior chamber, secondary cataract, atrophy of the ciliary body, retinal detachment, proliferative retinopathy with retinal gliosis, proliferation of the retinal pigment epithelium, drusen of Bruch's membrane, glaucomatous optic nerve atrophy and hemosiderosis bulbi.

At the site where the tack had been implanted the atrophic retina was firmly attached to the retinal pigment epithelium. The tip of the tack had produced a defect in the choroid and in the inner half of the sclera. A fibrovascular tissue proliferation arising from the choroid had grown into the adjacent retina. No inflammatory reaction, glial-cell proliferation or proliferation of the retinal pigment epithelium indicating a tissue response to the retinal tack could be shown (fig. 2).

Discussion

The examination shows that the retina is still attached at the tack site in spite of severe proliferative vitreoretinopathy. This indicates a firm adherence between the retina and the outer wall of the eye due to the tack implantation. The circumscribed fibrovascular proliferation arising from the choroid has similarities to choroidal reactions following traumatic rupture of the choroid [5]. This is not surprising as every tack implantation is necessarily accompanied by a small perforation of the choroid.

The lack of reactions of the retinal pigment epithelium is surprising as these cells are a major contributor to proliferative disorders such as proliferative vitreoretinopathy [8]. In this case 2 months following tack implantation there were no reactive responses present such as glial-cell proliferation or inflammatory choroidal reactions attributable to the retained tack.

These results are consistent with clinical observations showing no biomicroscopic complications caused by retained stainless steel and titanium tacks [1, 2, 7]. These findings may indicate that stainless steel or titanium are very inert materials that seem to be less likely to cause any significant inflammatory response in the human eye.

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