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EXPERIMENTAL AND HISTOPATHOLOGIC STUDY OF TWO TYPES OF ENCIRCLING SCLERAL EXPLANTS IN 33 RABBITS

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Purpose: In order to obtain information on tissue reaction after using encircling scleral explants, 30 fauve de bourgogne rabbits were implanted on one eye, using two different biomaterials (silicone sponge and hydrogel).
Material and methods: 33 rabbits underwent encircling scleral buckle with 2 different biomaterials. Silicone sponge (France Chirurgie Instruments) was implanted on 17 eyes, and hydrogel (Miragel ®) on 16. Both explants were oval-shaped and of 3 x 5 mm in cross-section. The mean period of implantation of 31 eyes was 8.4 months (range: 1-15). 7 eyes were implanted for 12 to 15 months and 18 for 6 to 11. After the period of implantation and regular follow-up, the 33 animals were killed and their eyes collected for a histopathologic study.
Results: Extrusion of the explant was observed in 4 cases, one of which was combined with an intrusion of the explant. In all other cases, both types of explants seemed to be well tolerated. Scleral buckling was visible in the peripheral eye fundus as a grayish bulge of the retina. Histopathologically, the scleral buckle was obvious in most cases, reversing the normal curve of the sclera and transmitting this change to the choroid. Under the encircling buckle, the sclera was atrophic in 5 eyes. The explants were always surrounded by a fibrous capsule, with a variable thickness, except those extruded and those on eyes collected after a short time of implantation. The capsular thickness was measured and maximal capsular thickness values were found significantly higher for hydrogel explants on 27 cases (p=0.05). Within the capsule, we constantly observed a superficial fragmentation of the hydrogel in eyes implanted with this material. A granulomatous foreign-body giant cell reaction was regularly observed around these fragments.
Conclusion: This study shows that the fragmentation process associated with the granulomatous reaction observed with hydrogel scleral explants is not related to the encircling buckle procedure, for it had been previously observed after segmental scleral buckling with the same material (ARVO, 1992).

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SILICONE/FLUOROSILICONE COPOLYMER OIL (SIFO) IN VITREORETINAL SURGERY.

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Purpose: Silicone/fluorosilicone copolymer oil (SiFO) is a polysiloxane derivative potentially useful as intraoperative tool and long term retinal tamponade agent. SiFO is characterized by higher-than-water density and low viscosity; its intraocular tolerance in rabbits up to two months is similar to that of silicone oil.
Methods: SiFO was used in 9 eyes with complicated retinal detachment. Five patients had rhegmatogenous retinal detachment and severe vitreoretinopathy, 4 had proliferative diabetic retinopathy with macular tractional retinal detachment and one had a tractional retinal detachment following expulsive hemorrhage. All cases required retinal tamponade inferiorly or posteriorly. In 4 patients SiFO was used after the retina was flattened with a gas-fluid exchange and/or perfluorocarbon liquid injection. In all other patients SiFO was used to displace subretinal fluid from the anterior retinal brakes and left in the eye as a short term tamponade. SiFO was removed after two months.
Results: In all patients the retina could be flattened intraoperatively. Eight of nine eyes (88,8 %) remained attached with follow-up of 2 months. Partial emulsification was noted in 5 of 9 eyes (55,5 %). No other ocular adverse effects were found at the end of follow-up.
Conclusions: SiFO seems to be a useful intraoperative tool and short term retinal tamponade agent in cases of complicated retinal detachment requiring inferior or posterior tamponade.

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EXPERIMENTAL TOLERANCE TO A NEW PERFLUORINATED LIQUID

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Purpose : To evaluate intraocular tolerance to a new perfluorinated liquid

Methods : Intraocular tolerence to a new perfluorinated liquid, with specific gravity of 1.45 and viscosity of 1, was investigated in rabbit eyes for periods of 7 days (five eyes) and 30 days (six eyes) after mechanical vitrectomy

Results : No clinical adverse effects on the retina were observed. Histologic examination revealed minimal pathologic changes after 7 and 30 days : photoreceptor drop down was observed in only one eye ; intercellular edema was occasionally observed, as well as preretinal cellular reaction consisting of macrophages

Conclusions : The results suggest that this new perfluorinated liquid may be suitable for temporary tamponade in vitreoretinal surgery. Experimental study of intraocular tolerance in pig eyes is currently in progress.

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EXPERIMENTAL INTRAOCULAR TOLERANCE OF TWO PERFLUORO-PHENANTRENES (PFP'S) - EFFECTS ON THE RETINAL VASCULAR SYSTEM

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Purpose.PFP (Vitreon) was reported to be well tolerated in the rabbit eye for 6 weeks. This study was undertaken to test the intraocular tolerance of 2 different products of PFP (adatomed, Vitreon) for a time period of 3 months.Particularly the influence to the retinal vascular system was investigated.
Methods: After gas compression of the vitreous 1,5ml of PFP were injected into 19 eyes of 19 pigmented rabbits. 15 eyes received PFP adatomed.2 of these were aphacic.Vitreon was injected into 4 eyes. Another 4 eyes were given either balanced salt solution or C4F8-gas. The contralateral eyes were used as untreated controls. Clinical examination was done by slit lamp, indirect ophthalmoscopy and Schiötz-tonometry.Video-FLA by SLO was performed in 1 set of eyes in each group at the end of the observation period. The eyes were enucleated 1,2,4,6,8,12 weeks after injection of PFP and examined histologically
Results: The 2 aphacic eyes showed immediate movement of PFP through the pupil into the anterior.chamber with acute inflammatory response and signs of corneal toxicity.In the phacic eyes there was no or only mild inflammatory reaction postoperatively.Emulsification of PFP and white, flaky precipitates in the vitreous cavity were noticed in all eyes within the first few days.Angiography showed narrowing of the retinal vessels and microaneurysms in all eyes with PFP from as early as the 4.day postoperatively.In the untreated contralateral eyes there were no or significantly less microaneurysms detected.Histological findings were epiretinal foam-cells,vacuoles in the inner retina and the RPE,structural disarrangement of the retina.These changes started from the 2nd week on, increased with time and were more distinct in the lower part of the retina,in the area of contact with PFP.
*Conclusions:*These changes in the vascular system and in the retina were similar with both different PFP's.The primary cause remains unclear.Either a toxic reaction or a mechanical effect has to be considered.Our findings support the opinion,that the intraocular application of PFP should be limited to a short term use.