Septal Compartments of the Orbit and Routes of Orbital Spread of Edema in a Cadaver by CT

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Purpose
To evaluate the septal compartments of the orbit and determine routes of intercompartmental edema spread in order to better understand the route of infection, inflammation, and posttraumatic hemorrhage in the orbit.

Materials & Methods
A mixture of saline and iodinated contrast (diluted 50/50) was injected into the orbit of two cadavers under CT guidance. Four injections were made on the first fresh cadaver; two in the medial subperiosteal space, one in the superiolateral extraconal space, and one in the retrobulbar space. Two injections were made on the second preserved cadaver; one in the medial subperiosteal space, and one in the retrobulbar space. CT imaging was performed at serial intervals postinjection to outline the orbital septal compartments and outline the routes of intercompartmental spread.

Results
The injections in the medial subperiosteal space in both cadavers first lead to preferential anterior extension into the preseptal space with subsequent extension into lids. The lower lid opacified with contrast to a greater extent than the upper lid. Then an extension laterally into perizygomatic subcutaneous tissues was continued. There was no significant extension from these injections into the retrobulbar intraconal space. There was no significant extension from the preseptal space medially into the nasal subcutaneous tissues. The retrobulbar injections in both cadavers first lead to complete filling of the intraconal retrobulbar space with subsequent circumferential rapid extension into the extraconal postseptal spaces. The injection into the superiolateral extraconal space in the first cadaver lead to extension circumferentially into the other extraconal spaces with rapid extension into the retrobulbar intraconal space.

Conclusion
Medial orbital subperiosteal disease processes include infections related to sinusitis or hemorrhage related to trauma. Disease processes originating in this location preferentially extend anteriorly. There extension is restricted by the periosteum within the orbit. At the preseptal space, there is restricted extension so that disease tracks laterally and into the lower lid greater than the upper lid. The orbital periosteum is in continuity with the orbital septum which is in continuity with the septum malaris. The septum malaris preferentially restricts the spread of disease processes laterally into the lower lid, rather than medially into the nasal soft tissues. These pathways of spread were confirmed by this CT contrast study. The intraconal and
extraconal spaces of the orbit are separated by a fascial layer encompassing the rectus muscles. This fascial layer is not complete, as it was once thought to be. Disease processes such as infection, inflammation, or hemorrhage can occur in both the intraconal and extraconal spaces. These disease processes can spread between both these spaces through defects in the conal fascia.

References