

Oxidized regenerated cellulose

Oxidized [regenerated cellulose](#) is a chemically altered form of [cellulose](#), which is particularly useful to control diffuse bleeding from broad surfaces. [Surgicel](#) has mechanical hemostatic effects as a result of swelling from blood absorption, and it activates coagulation on the collagen surface.

Neurosurgical [hemostasis](#) can be performed with [bipolar coagulation](#) and with the support of several dedicated [biomaterials](#) including oxidized regenerated cellulose (ORC; e.g., [Surgicel®](#), Johnson & Johnson, New Brunswick, NJ, USA). Oxidized regenerated cellulose is a sterile absorbable fibrous biomaterial that has become a major local [hemostatic agent](#) thanks to its ease of use, favorable [biocompatibility](#) and [bioabsorption](#) characteristics. However, some [postoperative](#) issues associated with its use, such as allergic reaction, [seroma](#), foreign-body reaction with compressive neuropathies and misdiagnosis during follow-up, have been reported. These [complications](#) could compromise clinical [outcomes](#) with a negative impact on patient [quality of life](#) and sometimes require risky major surgical procedures. An understanding of the specific properties of ORC combined with adequate surgical expertise and compliance with some basic rules are needed to optimize clinical outcomes and minimize postoperative issues ¹⁾.

Putnam TJ. USE OF THROMBIN ON SOLUBLE [CELLULOSE](#) IN NEUROSURGERY: CLINICAL APPLICATION. Ann Surg. 1943 Jul;118(1):127-9. PubMed PMID: 17858246; PubMed Central PMCID: PMC1617681 ²⁾.

Regenerated [oxidized cellulose](#) (ROC) sheets have gained popularity as an adjunct to a vascularized [nasoseptal flap](#) for closure of [dural defects](#) after [endoscopic endonasal](#) skull-base approaches (EESBS). However, evidence supporting its impact on the healing process is uncertain. This study was performed to evaluate the impact of ROC on the nasal mucosa and assess its effects on tissue pH, structure, and cell viability.

In 5 patients, a 1-cm² piece of ROC gauze was placed on the surface of the middle turbinate before it was resected as part of a standard EESBS. Mucosa treated with ROC was separated from untreated mucosa and a histologic examination of structural changes in the respiratory epithelium was performed. To assess the effect of ROC on pH, increasing amounts of ROC were added to culture medium. Nasal fibroblasts viability was assessed in the presence of ROC before and after the pH was neutralized.

Compared with unexposed controls, treated mucosa exhibited a higher incidence of cell necrosis and epithelial cell detachment. When added to Dulbecco's modified Eagle medium, ROC caused a dose-dependent decrease in pH of the medium. Only $1 \pm 0.8\%$ of cultured fibroblasts exposed to the ROC-induced acidic medium were alive, whereas $98.25 \pm 0.5\%$ of the cells were viable when the pH was neutralized ($p < 0.001$).

ROC applied in vivo to nasal mucosa induced epithelial necrosis likely by diminishing the medium pH, because pH neutralization prevents its effect. The ultimate effect of this material on the healing process is yet to be determined ³⁾.

1)

Franceschini G. Use of Oxidized Regenerated Cellulose as a Hemostatic Agent in Neurosurgery: Appraisals and Recommendations to Prevent Postoperative Complications and Facilitate Follow-Up. Surg Technol Int. 2021 Feb 16;38:sti38/1397. Epub ahead of print. PMID: 33592670.

2)

Putnam TJ. USE OF THROMBIN ON SOLUBLE CELLULOSE IN NEUROSURGERY: CLINICAL APPLICATION. Ann Surg. 1943 Jul;118(1):127-9. PubMed PMID: 17858246; PubMed Central PMCID: PMC1617681.

3)

Goldschmidt E, Schneck M, Gau DM, Carey L, Rasmussen J, Ferreyro B, Ajler P, Snyderman C, Wang E, Fernandez-Miranda J, Gardner PA. Effect of oxidized cellulose on human respiratory mucosa and submucosa and its implications for endoscopic skull-base approaches. Int Forum Allergy Rhinol. 2019 Dec 19. doi: 10.1002/alr.22495. [Epub ahead of print] PubMed PMID: 31856397.

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