

The use of Tissue-Engineered Cell sheets to improve healing after Radiofrequency Ablation in the Esophagus

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Introduction

RFA has proven to be a safe method to eradicate Barrett's esophagus. However some patients do not heal properly with squamous cell epithelium after RFA. The patients, sometimes referred to as "poor healers", are usually patients with long Barrett's segments and hiatus hernias. Transplantation of tissue-engineered autologous oral mucosal epithelial cell sheets in the esophagus has shown to be able to promote re-epithelialization of the esophagus after ESD. We wanted to investigate if cellsheets could improve the healing after RFA as well.

Aims & Methods

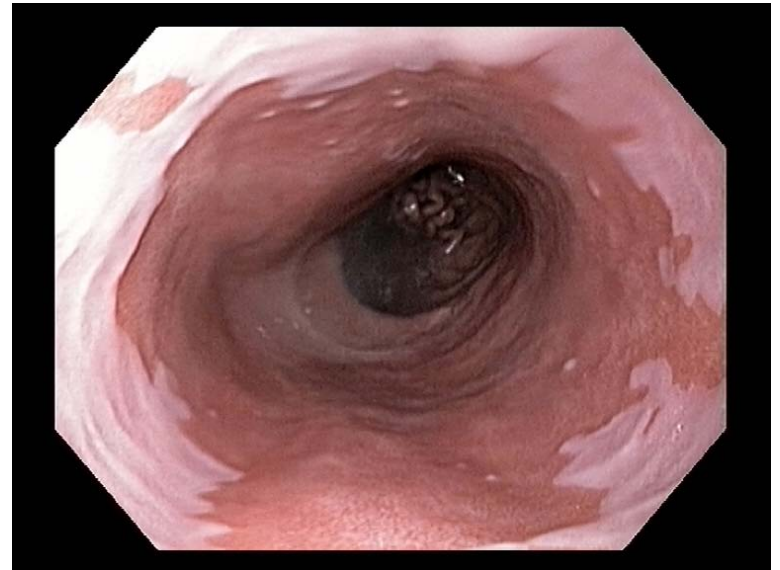
The first patient selected was a 71 year old male with a C8M10 Barrett's esophagus according to the Prague classification. He had intestinal metaplasia but no dysplasia. 24 hour manometry and pH-metry showed a severe reflux with reduced clearance of the distal esophagus. The second patient was a 72 year old female with initially a 11 cm long Barrett's esophagus with recurrent high grade dysplasia (HGD). The patient had previously been treated three times with endoscopic resection (ER) and six times with RFA but did still have four cm long, almost circumferential area with columnar lined epithelium containing HGD but no visible lesion. 24 hour manometry and pH-metry showed mild reflux but hypoperistaltic movements. We collected specimens of oral mucosal tissue from the patients and the epithelial cells were cultured for 16 days on temperature-responsive cell culture surfaces. At the day of the RFA a temperature reduction released the cells and we could thereby endoscopically transplant the cellsheets.

Results

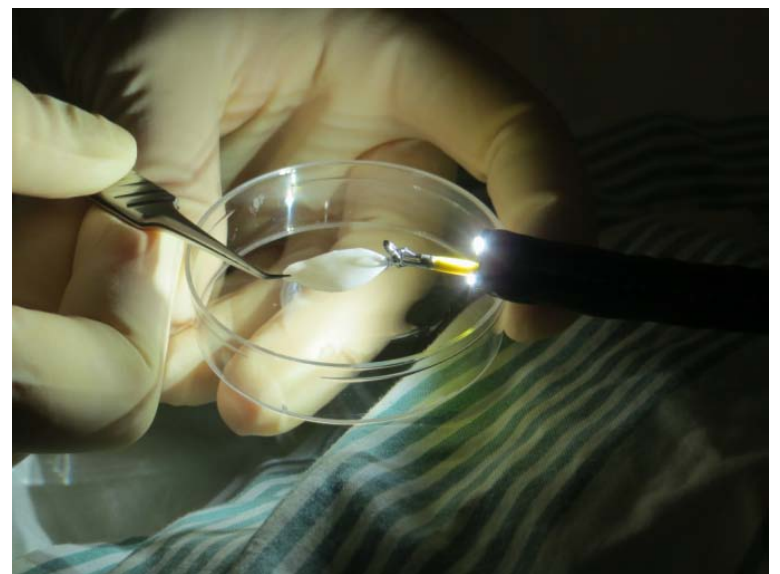
During the four week period the first patient had complete re-epithelialization. He experienced no dysphagia nor any stricture or other complications. RFA and cellsheet transplantation have reduced the area of columnar lined epithelium in the second patient but she still has some columnar lined epithelium left and additional RFA is planned. No patient had any complications.

Conclusion

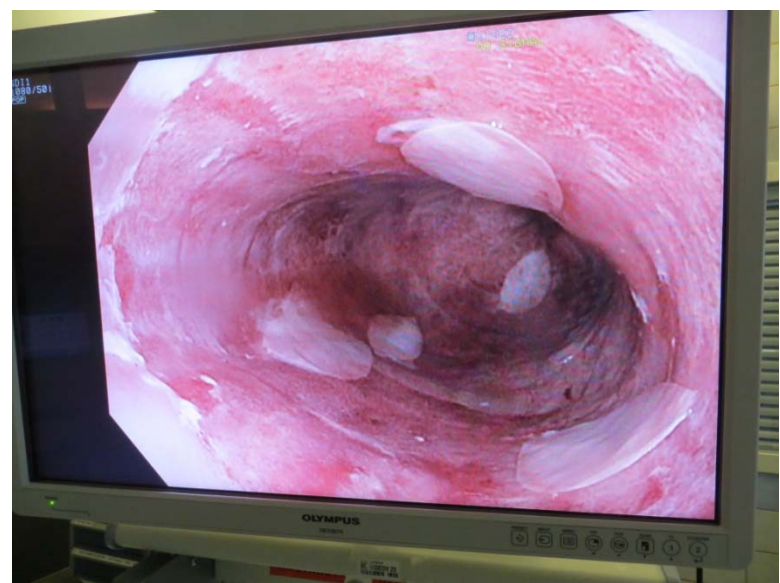
Transplantation of tissue-engineered autologous oral mucosal epithelial cell sheets in the esophagus after RFA seems to promote re-epithelialization. Further studies are needed to show if this could be a procedure to treat patients with poor healing after RFA.



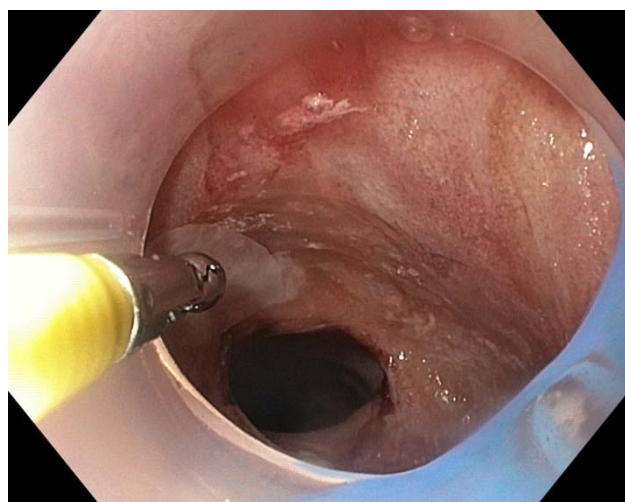
Above: C8M10 Barrett's esophagus



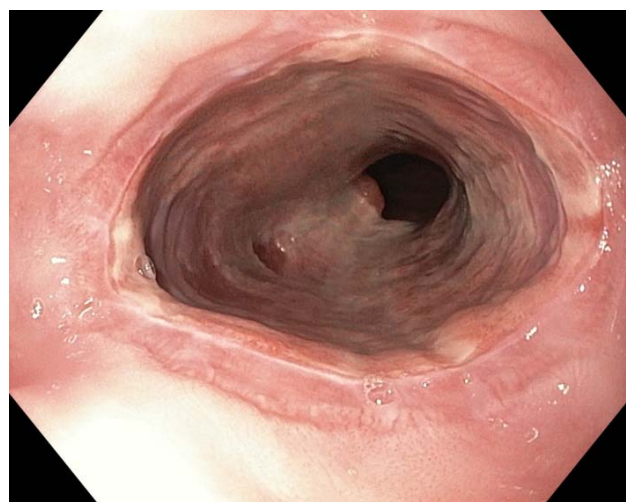
Above: Delivery of cellsheet to the endoscopist.



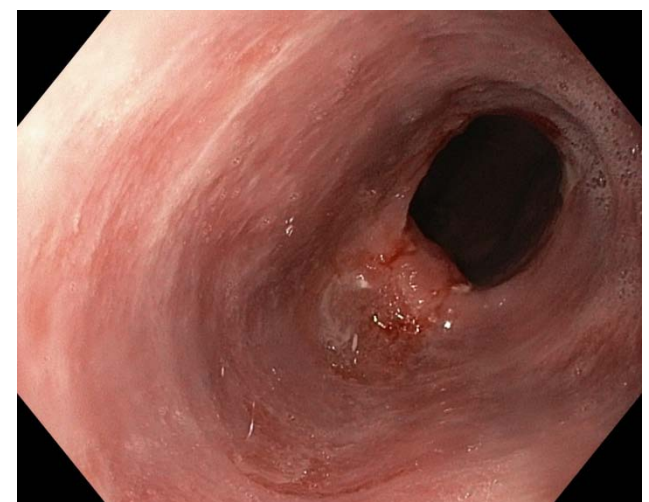
Above: Delivery of cellsheet to the endoscopist.



Endoscopic cellsheet transplantation



Two weeks after RFA and cellsheet transplantation.



Ten weeks after RFA and cellsheet transplantation.

References

- 1) Takagi R, Yamato M, Kanai N, et al. Cell sheet technology for regeneration of esophageal Mucosa" World J Gastroenterol 2012 October 7; 18(37): 5145-5150
- 2) Okhi T, Yamato M, Ota M, et al. "Prevention of Esophageal Stricture After Endoscopic Submucosal Dissection Using Tissue-Engineered Cell Sheets". Gastroenterology 2012;143:582-588
- 3) Korst R, Santana-Joseph S, Rutledge J, et al. "Effect of hiatal hernia size and columnar segment length on the success of radiofrequency ablation for Barrett's esophagus: A single-center phase II clinical trial". J Thorac Cardiovasc Surg 2011;142:1168-73