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Determination the depth of endoscopic placed sutures – a human cadaver study

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There has been some evidence that intraluminal placed sutures at the cardia lead to short-term improvement in patients with GERD. But first long-term results report about decrease in symptom free intervals and loss of sutures. A possible pathomechanism may be the misplacement of sutures. A review of the literature showed a lack of anatomical data, in which wall layer sutures are stitched. The aim of this study was to determine the depth of endoscopically placed sutures at the esophagus and the cardia in a human cadaver model.

Overall 120 sutures (esophagus: 62; cardia 58) were placed with an endoscopic suturing system in 10 cadavers at three different suction levels (0,4/0,6/0,8 bar). All sutured tissue was fixed in formalin and stained with H&E for histological examination of suture depth related to the anatomical layers.

The esophageal results shows, that none of the sutures was placed in the mucosa alone, 1.6% were found in the submucosa, 4.8% in the circular M. propria, 56.5% in the longitudinal M. propria and 37.0% were placed transmurally. At a suction level of 0.4 bar (0.6, 0.8 bar) 0% (0%, 1.6%) were placed in the submucosa, 3.2 % (0%, 1.6%) in the circular M. propria, 11.0% (25.8%, 12.9%) in the longitudinal M. propria and 12.9% (6.5%, 17.7%) were placed transmurally. In conclusion, most of the esophageal sutures were found in the muscular wall layer independent from suction pressure.

The cardial results shows that sutures could be placed transmurally independent of suction pressure. In the submucosa 19.0%, in the circular M. propria 17.2%, in the longitudinal M. propria 25.9% were found and 36.2% were placed transmurally. At a suction level of 0.4 bar (0.6, 0.8 bar) 10.3% (6.9%, 1.7%) were placed in the submucosa, 6.9 % (3.4%, 6.9%) in the circular M. propria, 8.6% (10.3%, 6.9%) in the longitudinal M. propria and 8.6% (10.3%, 17.2%) were placed transmurally. The cardia results show, that sutures can be placed in almost every anatomical layer, independent of suction pressure, but the muscular wall represents the anatomical layer that is most frequently stitched. At the cardia, higher suction pressures lead to significant deeper suturing.

To the best knowledge this works describes for the first time a systematic investigation of the depth of endoscopically placed sutures in a human cadaver model. It is not known whether these data can directly be transcribed into the *in vivo* situation.