Email Message

Dear All,

This week focused on drafting our Preliminary Report. We have spent time researching the existing treatment strategies associated with SGS that are currently being employed in the clinic. Dr. Paniello's insight aligns directly with our observed weaknesses of these strategies, namely that the regrowth of scar tissue limits the efficacy of current medical treatment. Our proposed design strategy is outlined in our preliminary report. I've attached our Gantt chart and SciNote additions over the past week. We look forward to keeping you all updated with our progress.

Sincerely,
Taylor Hughes, Brian Dallesasse, and Kyle Sachdev

Project created on 06.09.2016 02:03.

Report for project Senior Design

Task created on 07.10.2016 15:49.

Preliminary Report

No due date

No description

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Completed by Taylor Hughes on 07.10.2016 16:04.

Step 1: Gantt Chart

No description

[gantt_(4).png] File uploaded on 07.10.2016 16:03.

Comments for step Gantt Chart

No comments

Created by Kyle Sachdev on 07.10.2016 15:50.

Existing Solutions Between literature and patents, there are many readily available treatment options for subglottic stenosis. These can generally be divided into medical devices and surgical treatments, where medical devices are mainly used to treat less severe cases (grades I and II) and surgery is used in the more severe cases (grades III and IV). We will first describe medical devices, followed by surgical procedures. The most common medical device to expand the airway is a balloon catheter. Before the balloon catheter is inserted, the patient undergoes a laryngoscopy and the laryngoscope is suspended above the airway. A balloon catheter is then inserted and centered on the stenosis under direct visual guidance from the laryngoscope. It is inflated, normally with a saline solution, to some set pressure usually between 2-16 atm., but this value is highly variable. Pressure from the balloon pushes the scar tissue radially, widening the airway. The balloon is left in place until the oxygen saturation levels drop to 92%, where it is removed and an endotracheal tube is inserted for oxygenation (Whigham). In cases of severe stenosis, a carbon dioxide laser may be used to make radial incisions in the scar tissue to slightly open the airway. Balloon dilation is then used to move the scar tissue and widen the airway. A second device to treat subglottic stenosis works in a similar way to the balloon catheter; however, it has a few extra features. The device has a proximal end and a distal end connected by a shaft, which has two tubes, one

for ventilation and one to inflate the balloon that is attached to the distal end. Figure 3 shows a schematic of the device. Just like the balloon catheter, the device is centered on the stenosis and is inflated through 150 such that it pushes the scar tissue and opens the airway. 152 is the ventilation port on the proximal end and it can be left to the open air or an oxygen source can be attached. The oxygen travels through the ventilation tubing and is released from the distal end, reaching the rest of the body (Muni). Another medical device is the LT-Mold, which is basically a hollow tube made out of a soft material (Monnier6). It is generally used after dilation or cutting of the scar tissue. It is endoscopically placed to keep the airway open by preventing new scar tissue from forming. The softness allows blood flow to the surrounding tissue to avoid necrosis (Alshammari). The last medical device is a bioresorbable stent and it used in a similar manner to the previous device. It has an initial radial strength to create the desired alignment in the airway. Over time the radial strength of the stent decreases as it is resorbed, which allows the airway to adjust from artificial support to no artificial support (Fox). There are multiple surgical procedures that have been used to treat subglottic stenosis. First, there is the tracheotomy where the surgeon makes a small incision in the anterior neck and a tube is placed through it to give access to the airway. This method is normally only a temporary solution. Anterior Cricoid split is a potential alternative to a tracheotomy. In this procedure, a vertical incision is made through the cricoid cartilage and the first two tracheal rings. An endotracheal tube or a nasotracheal tube is placed to act as stent (Kelley). Additionally, there are multiple procedures that involve a laryngofissure, which is an operative opening into the larynx. One example is an anterior laryngofissure with a graft. A cartilage graft is placed in the laryngofissure to widen the airway. The connective tissue that surrounds the graft (perichondrium) is placed onto the lumen side, allowing for formation of tissue and creation of a barrier. A large external flap is created to prevent prolapsing of the graft into the airway. Other procedures using a larynogfissure include laryngofissure with division of posterior cricoid lumina and laryngofissure and division of cricoid lumina with anterior and posterior grafts (Zalzal10). There are two types of Laryngotracheal Reconstruction (LTR), which can be used as treatment. The general process is the same for both. A vertical incision is made through the narrowed airway and cartilage grafts are placed anteriorly, posteriorly or both. In single staged LTR, an endotracheal tube is acts as the stent while the grafts are healing. Double staged LTR uses a more permanent stent rather than the endotracheal tube (Saunders). Lastly, there is cricotracheal resection. In this procedure, the surgeon removes the scar tissue and some of the cricoid cartilage and raises the trachea to replace it. The larynx and the trachea are then sewn together (Monnier5).

sources: References 1. Alshammari, Jaber, and Philippe Monnier. "Airway stenting with the LT-Mold™ for severe glotto-subglottic stenosis or intractable aspiration: experience in 65 cases." European Archives of Oto-Rhino-Laryngology269.12 (2012): 2531-2538. 2. Whigham, Amy S., et al. "Outcomes of balloon dilation in pediatric subglottic stenosis." Annals of Otology, Rhinology & Laryngology 121.7 (2012): 442-448. 3. Fox, Julia C., and Stephen D. Pacetti. Bioresorbable Laryngotracheal Stent and Methods of Treatment. Abbott Cardiovascular Systems Inc., assignee. Patent US 20150045882 A1. 12 Feb. 2015. Print. 4. Kelley, Peggy E. "Anterior cricoid split." Operative Techniques in Otolaryngology-Head and Neck Surgery 20.4 (2009): 218-221. 5. Monnier, Philippe, Marcel Savary, and Germain Chapuis. "Partial cricoid resection with primary tracheal anastomosis for subglottic stenosis in infants and children." The Laryngoscope 103.11 (1993): 1273-1283. 6. Monnier, Philippe, and

Rene Gilliard. Laryngotracheal Devices and Methods of Use Thereof. Philippe Monnier, Rene Gilliard, assignee. Patent US 20050177233 A1. 11 Aug. 2005. Print. 7. Muni, Ketan P., Randy S. Chan, Sivette Lam, and Shrirang V. Ranade. Device and Method for Dilating an Airway Stenosis. Ketan P. Muni, Randy S. Chan, Sivette Lam, Shrirang V. Ranade, assignee. Patent US 20130184568 A1. 18 July 2013. Print. 8. Myers, Charles M., David M. O'Connor, and Robin T. Cotton. "Proposed grading system for subglottic stenosis based on endotracheal tube sizes."Annals of Otology, Rhinology & Laryngology 103.4 (1994): 319-323. 9. Saunders, M. W., et al. "Single-or-two-stage laryngotracheal reconstruction; comparison of outcomes." International journal of pediatric otorhinolaryngology 50.1 (1999): 51-54. 10. Zalzal, George H. "Treatment of laryngotracheal stenosis with anterior and posterior cartilage grafts: a report of 41 children." Archives of Otolaryngology–Head & Neck Surgery 119.1 (1993): 82-86. 11. Zalzal, George H., and Robin T. Cotton. "Glottic and subglottic stenosis."_Cummings CW. Otolaryngology Head and Neck Surgery. 2nd ed. St. Louis: Mosby (1993): 303-24.

Comments for result

No comments

Activity of task Preliminary Report

07.10.2016 15:49	*Kyle Sachdev* created task **Preliminary Report**.
07.10.2016 15:50	*Kyle Sachdev* added text result .
07.10.2016 16:03	*Taylor Hughes* created Step 1 **Gantt Chart**.
07.10.2016 16:04	*Taylor Hughes* completed Step 1 **Gantt Chart** (1/1 completed).

Samples of task Preliminary Report

No samples