Ages of both individual photographed and eye-tracked observer were obtained.

The eye-tracking camera measured average pupil diameter/lookzone region during all image observations.

RESULTS: The following observations were statistically significant at p<0.01 level:

(i) cleft images: rated less attractive than control images
(ii) increasing age (image): associated with step-wise decrease in attractiveness in both cleft and control images
(iii) higher attractiveness (image): associated with larger average observer pupil size
(iv) increased age (observer): associated with smaller average observer pupil size

CONCLUSIONS: Cleft faces are rated as less attractive, and with increasing age attractiveness diminishes (parallel-ing the same phenomenon seen with control faces). Increasing age of the observer is associated with diminishing average pupil size, whereas more attractive facial images stimulate pupil dilation.

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REFERENCES:
1. Berger Z, Dalton L. Coping with a cleft: Psychosocial adjustment of adolescents with a cleft lip and palate and their parents. Cleft Palate Craniofacial J. 48:435–443 Dec 2009
2. Kahneman D, Beatty J (1966) Pupil diameter and load on memory. Science 154:1583–5.
3. Hess EH, Polt JM (1960) Pupil size as related to interest value of visual stimuli. Science 132:349–50
4. Winn B, Whitaker D, Elliott DB, Phillips NJ Factors Affecting Light-Adapted Pupil Size in Normal Human Subjects Invest Ophthalmol Vis Sci 35:1132–1137 Mar 1994

Robotic-Assisted Cleft Palate Repair: A Feasibility Study

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PURPOSE: The number of applications in which robotic-assisted surgery are used has grown steadily, especially in the fields of transoral, reconstructive, and microsurgery. We evaluate the robot in cleft palate repair by conducting a feasibility study.

METHODS: Eight cadaveric human heads were used to evaluate cleft palate repair and radical intravelar-veloplasty utilizing the Da Vinci robot. Dissection of the levator veli palatini with the robot was randomized to either the right or left side. The opposite side of the velum acted as the control and was dissected by hand. Times required to complete subsequent steps of the procedure using the robot were measured.

RESULTS: The time (seconds±SD) to perform a robotic dissection (491 ± 90) of the levator muscle was equivalent to the time taken to perform a dissection by hand (552 ± 140; p: 0.349). Time for repair of the levator (309 ± 106) and oral-mucosa closure (1185 ± 165) decreased with experience, while nasal-mucosa closure (980 ± 190) did not. Based on average times, repair of a cleft palate with intravelar-veloplasty would take 57.4 minutes when all the steps are performed using the robot. Both the surgeon and the assistant felt the instrumentation was ergonomic and visibility was excellent. While there was no haptic feedback capability, no notable complications occurred.

CONCLUSIONS: Robotic-assisted repair of cleft palate defects with intravelar-veloplasty is feasible on adult cadavers and may provide enhanced visualization and ergonomics. There is a trend towards faster operating time with experience on the robot. Although untested in the pediatric population, robotic technology may offer a safe and effective technique.

Utilizing Shear Stress to Optimize Endoluminal Linings within Pre-Vascularized Engineered Tissues

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INTRODUCTION: Regeneration of thicker or larger tissues of clinically relevant size remains a challenge due to poor oxygen diffusion into cells that are contained within non-vascularized tissue-engineered constructs. In our previous work, we fabricated vascularized tissue engineered
constructs that remained viable for more than 28 days in static culture. However, without exposing the vascular lining cells to flow, their functionality and in vivo stability are suboptimal. Here, we “prime” the constructs by dynamically perfusing them and determine how flow induced shear stress optimizes the endoluminal surfaces of our tissue-engineered vessels.

MATERIALS AND METHODS: Pluronic F127 fibers, 1.5 mm in diameter, were sacrificed in type I collagen, creating a central looped microchannel. 100μL polyculture cell suspension mixture of 5 x 10⁶ cells/mL of human foreskin fibroblasts and 5 x 10⁶ cells/mL of human aortic smooth muscle cells was seeded into the microchannel. The following day, a 100μL cell suspension of 5 x 10⁵ cells/mL of human placental pericytes and 5 x 10⁶ cells/mL of human umbilical vein endothelial cells was seeded into the microchannel. All constructs underwent daily media changes in static culture for 7 days, and then half were perfused at 10 dynes/cm² for an additional 7 days. After 14 days, scaffolds were fixed and processed.

RESULTS: After 7 and 14 days of culture, constructs formed intact endoluminal linings along the microchannel with increasing thickness over time. CD31 expressing endothelial cells were noted along the luminal surface after 7 days and throughout the endoluminal lining after 14 days, establishing a neointima. Constructs undergoing static and dynamic culture had robust, vascular linings that spanned the entire microchannel. However, dynamic constructs had a 59% thicker lining in the channel (p=0.0057). Ki67 staining demonstrated statistically significant increased cell proliferation in constructs that experienced dynamic perfusion suggesting stimulation by the shear stress (p=0.0429).

CONCLUSION: Shear stress through dynamic perfusion was used to optimize the development of a layer of vascular lining cells to provide a non-thrombogenic surface to allow continuous blood flow in these tissue engineered vessels. Exposing pre-vascularized engineered tissues to controlled perfusion produces vessels with architecture that more accurately recapitulates the in vivo phenotype and provides a surface for thrombosis-free blood flow, allowing for surgical implantation via microanastomosis.

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Single and Double Reinnervation of the Gastrocnemius Muscle in Rats - Experimental Model

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INTRODUCTION: Muscle contraction generated by electrical impulses originated simultaneously from two different neural sources may be an interesting alternative for facial palsy and brachial plexus injury treatment. We hypothesized that double reinnervation leads to better muscle functional recovery. Thus, an experimental model was created to assess double and single muscle reinnervation of the gastrocnemius muscle in rats.

MATERIALS AND METHODS: Fifty adult Wistar rats after having their right peroneal nerve sectioned were allocated into 5 groups: (C) control; (TS) in which the right tibial nerve was also sectioned and not repaired; (EE) where after section, the right tibial nerve was immediately repaired by primary neurorrhaphy; (ES) where after section, the right tibial nerve was immediately repaired by end-to-end neurorrhaphy associated to end-to-side neurorrhaphy of the peroneal nerve to the tibial nerve distal to the primary neurorrhaphy site; and (CEE) where after section, the right tibial nerve was immediately repaired by convergent end-to-end neurorrhaphy between the proximal stumps of the tibial and peroneal nerves to the distal stump of the tibial nerve. The outcomes were assessed 12 weeks after the experiment by walking track, electromyography, gastrocnemius muscle weight ratio and histomorphometric analysis of distal tibial nerve.

RESULTS: Compared to simple innervation group (EE), the double innervation groups had higher functional results in walking track (p <0.05). When compared to the EE group, the CEE group showed greater amplitude (p = 0.006) and higher latency (p = 0.041) to electromyography. Regarding muscle weight index, there was no difference between groups of single and double innervation (p> 0.705). Histologic analysis revealed higher axonal density in the CEE group compared to the EE group (p = 0.001) and the ES group (p = 0.002).