



Abstract 17: Reduction Mammoplasty Improves Quality-of-Life in Adolescents with Macromastia: A Longitudinal Cohort Study

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unproven safety profiles or translational potential. Here we show that an FDA-approved drug with a previously proven record of safety is able to completely inhibit ectopic lesions in a mouse model of FOP carrying the same mutation.

METHODS: Mice carrying the floxed FOP mutation (*ACVR1 R206H*) received a simultaneous hindlimb injection of Ad.cre to induce gene transformation and cardiotoxin to induce local injury (Ad.cre/CTX). Mice were treated with either daily vehicle control or rapamycin (5 mg/kg) administered i.p. (n=10/group). The presence of mesenchymal cells at the injury site was determined using immunofluorescent staining for PDGFR α and Sca-1 five days after injury. Ectopic cartilage and bone were determined using histology and microCT imaging 21 days after injury. PLGA microparticles were synthesized to deliver rapamycin as a slow-release; flow cytometry was used to quantify release time profile. Finally, a separate set of mice underwent Ad.cre/CTX injection with resection of formed HO 3 weeks after injury and subsequent treatment with or without rapamycin to eliminate recurrence.

RESULTS: While mice which received Ad.cre/CTX without rapamycin produced ectopic bone consistently, treatment with rapamycin nearly eliminated HO based on both microCT imaging (34.0 mm³ v. 1.0 mm³, p<0.01). Furthermore, histologic imaging showed elimination of ectopic cartilage with rapamycin treatment based on H&E, pentachrome staining (red arrows) and SOX9 immunofluorescence. Finally, rapamycin reduced the presence of mesenchymal cells (PDGFR α + or α SMA+) at the injury site. PLGA microparticles released rapamycin during the first week after injury based on flow cytometry analysis. Mice that had resection of HO and were treated with rapamycin did not recur, while 100% of mice which had resection of HO without rapamycin developed new lesions at the resection site.

CONCLUSION: These findings demonstrate that rapamycin, an FDA-approved drug, eliminates ectopic cartilage and bone in a mouse model of FOP. This may occur through a reduction in the presence of activated mesenchymal cells at the injury site. These findings have prompted the initiation of clinical studies to assess efficacy of this potential therapeutic in humans. A slow-release microparticle may obviate repeated treatments in these patients. Rapamycin may also have a role in the management of FOP patients with ossified lesions, making surgical resection a reality for the first time.

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Reduction Mammoplasty Improves Quality-of-Life in Adolescents with Macromastia: A Longitudinal Cohort Study

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PURPOSE: Macromastia, the benign overgrowth of one or both breasts, is a common condition with a well-documented negative impact on mental and physical health, self-esteem, and social functioning. Reduction mammoplasty during adolescence is relatively controversial; the psychological effects of treatment in this age group are largely unknown. This study seeks to measure changes in health-related quality-of-life (HRQOL) and breast-related symptoms following reduction mammoplasty in adolescents, and explore the effects of age and BMI category at time of surgery on postoperative quality-of-life outcomes.

METHODS: In this longitudinal cohort study, our group administered the Short-Form 36v2 (SF-36), Rosenberg Self-Esteem Scale (RSES), Breast-Related Symptoms Questionnaire (BRSQ), and Eating-Attitudes Test-26 (EAT-26) to 102 adolescents with macromastia and 84 unaffected female controls, aged 12 to 21 years. Patients with macromastia completed surveys preoperatively and postoperatively (at 6 months, 1 year, 3 years, and 5 years). Control subjects completed baseline and follow-up surveys at the same intervals. Higher scores in the SF-36, RSES, and BRSQ are associated with a better HRQOL, global self-esteem, and fewer/less severe breast-related symptoms, respectively. Higher scores in the EAT-26 are indicative of disordered eating thoughts and behaviors.

RESULTS: Mean age at the time of reduction mammoplasty was 17.9 ± 1.7 years. Patients with macromastia demonstrated significant score improvements postoperatively from baseline on the RSES, BRSQ, and in seven out of eight SF-36 domains. Postoperative subjects scored significantly higher than controls at follow-up on the RSES and in four SF-36 domains (physical functioning, bodily pain, social functioning, and mental health), when controlling for differences in baseline BMI category ($p < 0.05$, all). Follow-up scores on the EAT-26, BRSQ, and in four SF-36 domains (role-physical, general health, vitality, and role-emotional) did not differ between the two groups ($p \geq 0.05$, all). Following reduction mammoplasty, the proportion of patients experiencing pain, bra strap grooving, inframammary intertrigo, and difficulty participating in sports and finding properly fitting bras/clothing was significantly lower than at baseline ($p < 0.001$, all), with postoperative rates similar to those seen in control subjects ($p \geq 0.05$, all). Both younger (< 18 years, $n = 54$) and older patients (≥ 18 years, $n = 48$) had significant postoperative improvements in RSES and BRSQ scores. On the SF-36, only older patients experienced a benefit in the mental health subscale ($p < 0.001$). When the macromastia group was stratified by BMI category, both healthy-weighted ($n = 38$) and overweight/obese patients ($n = 64$) had significant postoperative improvements on the RSES and BRSQ, and six SF-36 domains. Unlike their healthy-weighted counterparts, overweight/obese patients did not have improvements in SF-36 general health ($p = 0.65$).

CONCLUSION: Reduction mammoplasty was significantly associated with improvements in HRQOL and breast-related symptoms of adolescent patients. Postoperatively, patients report levels of well-being similar to, if not higher than, unaffected age-matched females. These results largely do not vary by BMI category or age. Patients and providers should be aware of the potential benefit of reduction mammoplasty for adolescents with symptomatic macromastia.

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Creating a Low Profile Anchor to Eliminate High Profile Suture Knots

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PURPOSE: Large sutures, such as mesh suture or tape suture, are used in hernia and tendon repair and have shown enhanced mechanical performance compared to smaller suture. However, a limitation to the use of large suture is knot size. Large sutures produce high profile knots that are susceptible to palpability, infection, and increased foreign body response. The goal of this study was to use 3D printing to develop an anchoring device to replace suture knots. The device was designed to be low profile and to have superior mechanical performance to a knot.

METHODS: Flat, cylindrical anchor prototypes were iteratively created using 3-D design software (SolidWorks®) and 3D printed from a Carbon3D printer using liquid polymer resin. After testing multiple iterations of the device, we settled on a male component with four horizontal posts that integrate into opposing holes of a female component. The posts were placed through pores of a hernia mesh, providing multiple fixation points. Each post was designed with a distal element to serve as a locking mechanism when approximated to the female component. The profile of the anchor was compared to that of a large suture knot (mesh extension, 1cm diameter, 4 throws). Next, monotonic tensile testing of the anchor vs. a knot control in a silicone gel model was performed using an Instron in accordance with ASTM D5034. Failure load and mode of failure were recorded and compared. This was followed by cyclic tensile testing of the anchor and knot control at a range of 10 to 20N (maximum physiologic force on the abdomen is 16N/cm²) at 1Hz for 200 cycles, then pull to

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