Ergonomics of Mesh Placement in Robotic Versus Laparoscopic Inguinal Hernia Repair

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Utilization of Telehealth in the Developmental Behavioral Clinics at the University of Nebraska Medical Center

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**Mentor:** Howard Needelman

**Program:** Developmental Behavioral Pediatrics

**Type:** Original Research

**Background:** Children with Developmental disabilities (DD) may require frequent health care visits and are more likely to experience unmet health services, leading to poor adult health and functional status. The prevalence and complexity of these conditions are increasing. Despite this, there are some barriers to care such as extended wait times, a limited pipeline of new Developmental- Behavioral Pediatrics (DBP) providers, most are in urban centers. Unique logistical, psychological, and behavioral barriers in accessing healthcare for children with DD include the need for special transportation and multiple or specialized caretakers. Telehealth may improve access to care and reduce the impact of transportation barriers. There is limited knowledge in the literature to evaluate telehealth’s utilization and acceptability in DBP. At the emergence of the pandemic, telehealth alternative to in-person health care rapidly expanded as new legislation passed and payers reimbursed telehealth more broadly. Before the pandemic, our DBP clinics did not utilize telehealth. With the pandemic’s onset, there was a rapid transition to seeing all patients via telehealth to ensure continued care. Our clinics currently provide a hybrid of telehealth and in-person visits, mainly depending on families’ preferences. There is limited knowledge in the literature to evaluate telehealth’s utilization in DBP. This study aims to understand the utilization of telehealth and ensure continued care for our patients.

**Methods:** Descriptive analysis to determine the distribution of each indicator, P-values using a one-sample t-test when meeting the assumption of normality.

**Results:** We had 1030 patients, 325 (31.5%) females and 705 males (68.45%). Our patients were mainly Caucasians 647 (62.82%) and not Hispanic 770 (74.76%). We had 1257 (65.58%) clinic visits, and 660 (34.42%) missed visits before the implementation of telehealth. We had 1615 (72.49%) clinic visits and 613 (27.51%) missed visits after implementation of telehealth, despite one less provider. Our p-value for the difference in visits was < 0.0001, suggesting that the average number of visits is different before and after the implementation of telehealth. Our p-value for the difference in missed visits was > 0.05, implying that we do not have sufficient evidence to say that the average number of missed visits is different before and after the implementation of telehealth.

**Conclusion:** With ongoing shortages of DBP providers and unique transportation barriers for DBP patients, ongoing utilization of telehealth will help with improving access and continued care to the patients. Further data analysis may help identify different groups of patients that we may better serve with increasing telehealth utilization.

https://doi.org/10.32873/unmc.dc.gmerj.4.1.015

Ergonomics of Mesh Placement in Robotic Versus Laparoscopic Inguinal Hernia Repair

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**Mentor:** Ivy N. Haskins and Ka-Chun Siu

**Program:** General Surgery

**Type:** Original Research

**Background:** Differences in ergonomics between laparoscopic and robotic-assisted inguinal hernia repairs (LIHR vs. RIHR) have been previously studied. However, specific differences in the ergonomics of mesh placement between LIHR and RIHR remain to be determined. Our aim was to determine if there are differences in the ergonomics of mesh placement between LIHR and RIHR, as measured by upper extremity muscle activation.

**Methods:** Surface electromyography (EMG) of four upper extremity muscle groups was recorded bilaterally during mesh placement in five laparoscopic and five robotic inguinal hernia repairs. The following muscle groups were evaluated: upper trapezius (UT), anterior deltoid (AD), flexor carpi radialis (FCR) and extensor digitorum (ED). Muscle activation as a percent of maximum voluntary contraction and muscle fatigue as the median frequency of muscle activations was calculated.

**Results:** EMG analysis of the eight muscle groups revealed a trend towards increased right sided muscle activation in LIHR compared to RIHR (Table 1). Muscle activation of the right FCR was 7.67% in LIHR compared to 3.89% in RIHR (p < 0.001). RIHR had significantly higher activation of the left AD (9.22%) compared to LIHR (6.99%; p = 0.044). LIHR trended towards decreased muscle fatigue compared to RIHR. The level of fatigue of the right AD in LIHR was significantly lower compared to RIHR (p = 0.05).

**Conclusion:** Despite higher muscle activations in LIHR, LIHR had a lower level of muscle fatigue during mesh placement compared to RIHR. Additional studies are needed to determine if higher muscle activation protects against muscle fatigue in inguinal hernia repair.

https://doi.org/10.32873/unmc.dc.gmerj.4.1.016
Comparison of Multiple IOL Power Calculation Formulas Using Keratometric Data From a Scheimpflug Camera vs. Swept-Source OCT

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**Mentor:** Ronald R. Krueger
**Program:** Ophthalmology
**Type:** Original Research

**Background:** IOL calculation formulas can use multiple different metrics to run their calculations before cataract surgery. The purpose of this study was to analyze the accuracy of multiple IOL power calculation formulas using the IOL Master 700 keratometry (K) and total K (TK) measurements metrics and the Pentacam K and equivalent K readings (EKR).

**Methods:** This was a retrospective analysis of consecutive patients submitted to phacoeulmsification. Inclusion criteria were patients with good quality scans from both devices on the same day, visual acuity of 20/40 or better at the 1-month postoperative visit, and no surgical complications. Patients with previous surgery, other ophthalmic disorders, and history of eye trauma were excluded. Initial screening identified 45 out of 59 eligible patients. Only one eye per patient was included. Assessment compared the keratometric data among devices and each formula’s mean absolute error (MAE) using different keratometric input and patients within 0.25 D, 0.50 D and 1.00 D of the predicted error. Postoperative refraction was assessed at one month postoperatively.

**Results:** Keratometric variables were normally distributed, and a repeated measures ANOVA was found to be statistically significant (p < 0.01). Post-hoc analysis showed a statistical difference between IOL Master K and TK (p < 0.01) and the IOL Master TK and Pentacam EKR (p < 0.01). Regarding the IOL formulas calculation, the EVO IOL Master K performed best (± 0.50 D = 96%, MAE = 0.24 D), followed by the Pearl DGS TK (± 0.50 D = 93%, MAE = 0.21 D) and the Pearl IOL Master K (± 0.50 D = 93%, MAE = 0.26 D).

**Conclusion:** Formula choice should take into consideration which keratometric values are being used. Also, using Pentacam K, especially the EKR, did not improve any formula accuracy. Future analysis will include optimization of A-constants, assessment other IOL types, and stratification of subjects by groups of interest.

https://doi.org/10.32873/unmc.dc.gmerj.4.1.017

<table>
<thead>
<tr>
<th>Muscle Group</th>
<th>%MVC LIHR</th>
<th>%MVC RIHR</th>
<th>p-value</th>
<th>Fmed LIHR</th>
<th>Fmed RIHR</th>
<th>p-value</th>
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<tr>
<td>Left UT</td>
<td>23.59</td>
<td>12.77</td>
<td>0.280</td>
<td>52.92</td>
<td>55.06</td>
<td>0.610</td>
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<td>Left AD</td>
<td>6.99</td>
<td>9.22</td>
<td>0.044*</td>
<td>62.59</td>
<td>58.31</td>
<td>0.280</td>
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<td>Left FCR</td>
<td>5.35</td>
<td>4.58</td>
<td>0.430</td>
<td>94.52</td>
<td>76.64</td>
<td>0.058</td>
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<tr>
<td>Left ED</td>
<td>19.5</td>
<td>20.9</td>
<td>0.700</td>
<td>104.24</td>
<td>94.14</td>
<td>0.460</td>
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<tr>
<td>Right UT</td>
<td>30.1</td>
<td>13.2</td>
<td>0.060</td>
<td>55.17</td>
<td>56.64</td>
<td>0.530</td>
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<td>Right AD</td>
<td>8.97</td>
<td>7.43</td>
<td>0.083</td>
<td>74.54</td>
<td>58.47</td>
<td>0.005**</td>
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<tr>
<td>Right FCR</td>
<td>7.64</td>
<td>3.89</td>
<td>&lt;0.001***</td>
<td>77.54</td>
<td>76.50</td>
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<td>Right ED</td>
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<td>22.2</td>
<td>0.070</td>
<td>115.05</td>
<td>94.32</td>
<td>0.094</td>
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</table>

a %MVC = muscle activations as a percent of maximum voluntary contraction.

b Fmed = median frequency of muscle activations.

*p < 0.05.  **p < 0.01.  ***p < 0.001.

Association Between Mortality and Early Post-operative Ambulation After Distal Femur Fracture Fixation in Elderly Patients

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**Mentor:** Sara Putnam
**Program:** Orthopaedic Surgery
**Type:** Original Research

**Background:** There has been an increased interest regarding the impact of ambulation on outcomes in elderly patients who sustain lower extremity fractures. This study sought to evaluate the effect of early postoperative ambulation on postoperative mortality in elderly patients who sustained distal femur (DF) fractures.

**Methods:** This is a retrospective review of patients ≥65 years of age who underwent open reduction internal fixation (ORIF) of a DF fracture. Subjects were divided into all-comer and isolated injury cohorts. Both cohorts underwent statistical analysis to evaluate associations between both the modified 5-factor frailty index (mFI-5) and postoperative ambulation with regard to mortality at 30-days and 1-year.

**Results:** Patients who ambulated within the first three postoperative days had an odds ratio of 3.41 of survival at one year compared to those who did not, independent of whether they had 1 or >1 fracture (p=0.028, 95% CI 1.144-10.143); this was statistically significant in both the all-comer (p=0.037) and isolated