**Original Articles**

**Effect of a Pediatric Surgeon on Pediatric Inguinal Hernia Repair --- Evaluation of the Importance of Surgeons with Subspecialty Training by a Single-Hospital Comparative Experience**

Yu-Li Lin¹, Tien-Jye Chang²

**Background:** Inguinal hernia repair is one of the most common operations performed by pediatric surgeons. The aim of this communication is to analyze the differences in results of pediatric inguinal hernia repairs in a single hospital with and without the participation of a pediatric surgeon.

**Methods:** All data were collected from the children who underwent hernia repairs at Cheng Ching hospital between December 2002 and November 2004. At present Cheng Ching Hospital is a regional hospital that offers all types of surgical specialists, but before December 2003 there was a lack of pediatric surgeons. The cases mentioned above were divided into group I (December 2002 to November 2003) and group II (December 2003 to November 2004). Group II was further divided into group IIa (operations performed by a general surgeon or urologist) and group IIb (performed by a pediatric surgeon). Cases done by general surgeons or urologists were compared with those done by a pediatric surgeon. The Student’s t test was used for continuous variables.

**Results:** In group I the operations for 102 cases were performed equally by general surgeons and urologists. In group II a pediatric surgeon performed 64.2% of operations for 190 cases. Although the number of cases in group II was greater than in group I, the number of operations performed by general surgeons was significantly lower (P<0.001) while the number of operations performed by urologists was similar to that in group I. Patients in group IIb were younger than in group IIa (P<0.001) but not younger than in group I (P=0.08). Patients in group IIa were also older than in group I, but the difference was not significant (P=0.07). Group IIb had more young cases (<1-year-old, P<0.001) and bilateral operations (P<0.001) than in groups I and IIa. There were no surgical complications and recurrence was not found during this study.

**Conclusions:** Regional hospitals that offer the service of pediatric surgeons receive an increasing number of patients requiring inguinal hernia repairs. This increase is particularly prevalent in younger patients and in cases with bilateral hernias require treatment. These results therefore reveal that subspecialty training is important because it affects the intention of patients and their parents to seek medical advice.

**Key words:** inguinal hernia, pediatric surgeon, subspecialty training

From the Division of Pediatric Surgery¹, Department of Surgery, Cheng Ching Hospital, Graduate Institute of Microbiology and Public Health, College of Veterinary Medicine, National Chung Hsing University, Department of Veterinary Medicine², College of Veterinary Medicine, National Chung Hsing University, National Museum of Natural Science, Taiwan

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Address reprint request and correspondence to: Prof. Tien-Jye Chang, Department of Veterinary Medicine, College of Veterinary Medicine, National Chung Hsing University, 250 Kuo Kuang Rd. Taichung, Taiwan, E-mail: tjchang@dragon.nchu.edu.tw
Pediatric inguinal hernia (PIH) repair is one of the most common operations done by pediatric surgeons (PS). However, since not all hospitals are able to provide the service of pediatric surgeons, many PIH repairs are done by non-PS. Previous studies revealed a better outcome of PIH repairs done by PS. However, results from these studies used data taken from different hospitals. It is possible that variability between hospitals could exert some uncontrolled influence on the results. Therefore, our aim is to analyze the differences of PIH repairs in a single institution with and without a pediatric surgeon to evaluate the influence of subspecialty training.

Materials and Methods

All data was recorded from children (<15-year-old) at Cheng Ching Hospital between December 2002 and November 2004. Cheng Ching Hospital is a regional hospital that offers all types of surgical specialists with the exception of a lack of pediatric surgeons which persisted until December 2003. The cases mentioned above were divided into group I (December 2002 to November 2003) and group II (December 2003 to November 2004). All cases were diagnosed by surgeons themselves through gross inspection or physical examination and confirmed by pathology (mesothelial lining). Group II was further divided into group IIa (operations done by non-PS) and group IIb (done by PS). All cases were followed-up by a telephone questionnaire during May 2007. We considered demographics, site of operation, types of surgeons, and complications as variables in this study. The Student’s t test was used for continuous variables. We did not record the duration of operation because it was difficult to reveal a significant difference for short operations. In addition, most cases had out-patient surgeries; therefore the estimation of the length of hospital stay was unreliable.

Results

There were 102 cases in group I, equally operated upon by general surgeons and urologists (Table 1). In group II, there were 190 cases, and 64.2% of the operations were performed by one pediatric surgeon (Table 1). In group II the number of cases performed by general surgeons were significantly lower than for group I (P<0.001), however there was no difference between these groups in the number for surgeries performed by urologists (Table 1). Patients in group IIb were significantly younger than those in group IIa (48.0±35.7 months vs. 67.2±37.8 months, P<0.001, Table 2) but not in group I (56.3±38.6 months, P=0.08). Cases in group IIa were older than in group I, but the difference was not significant (P=0.07). There were more young cases (<1-year-old) in group IIb than in group I or group IIa (18.0% vs. 10.8% and 2.9%, P<0.001, Table 2). Group IIb had more bilateral operations than group I or group IIa (38.5% vs. 4.9% and 7.4%, P<0.001, Table 1). There were 6 incarcerated cases in group I and 10 cases in group IIb (5.9% vs. 5.3%). No reports of recurrence or complications were found in either group.

Table 1. Demographics, site of operation, and types of surgeons by different groups of surgeons. (PS: pediatric surgeon, GS: general surgeon, Uro: urologist)

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
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<th>Right</th>
<th></th>
<th>Bilateral</th>
<th></th>
<th>Total</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
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<td>GS</td>
<td>14</td>
<td>8</td>
<td>15</td>
<td>12</td>
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<td>3</td>
</tr>
<tr>
<td></td>
<td>Uro</td>
<td>16</td>
<td>2</td>
<td>27</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>30</td>
<td>10</td>
<td>40</td>
<td>15</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td>Group II</td>
<td>a</td>
<td>GS</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Uro</td>
<td>20</td>
<td>4</td>
<td>15</td>
<td>6</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29</td>
<td>5</td>
<td>36</td>
<td>5</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Group II</td>
<td>b</td>
<td>PS</td>
<td>29</td>
<td>5</td>
<td>56</td>
<td>17</td>
<td>27</td>
</tr>
</tbody>
</table>

* P<0.001 vs. group I
** P<0.001 vs. group I (GS)
Discussions

Previous work indicates that surgeons with subspecialty training achieve better results than general surgeons for gynecologic cancer surgeries, colorectal cancer surgeries, hepatobiliary and pancreatic surgeries. In addition to PIH, many studies revealed that children with idiopathic hypertrophic pyloric stenosis, appendicitis, and vesicoureteral reflux also had better outcomes when cared for by pediatric surgeons. However, results from these studies used data taken from different hospitals that could create variability in the final results. Additionally, these results could not indicate the importance of doctors with subspecialty training to child patients or their parents. By collecting all cases from a single institution we were able to ensure that referral patterns and the size of the referral population remained consistent throughout the study, providing a more accurate representation of the importance of subspecialty training.

We chose PIH as the object of this study because this requires one of the most common operations done by pediatric surgeons. PIH repairs in Cheng Ching Hospital without a pediatric surgeon were equally performed by general surgeons and urologists. The total number of PIH cases admitted to the hospital increased with the participation of a pediatric surgeon. However the number of operations performed by general surgeons decreased while the number performed by urologists remained the same. The effect of having a subspecialty-trained pediatric surgeon on the staff became evident from the third month of the study period where the pediatric surgeon operated on most cases (Fig 1). The number of operations performed by the urologists gradually decreased after one year (data not shown).

However, the influx of PIH cases at Cheng Ching Hospital was not simply a result of patients switching from general surgeons because the number of increased cases exceeded that previously covered by the general surgeons. It is likely that there were several factors that contributed to the influx of PIH patients. First, potentially the number of referrals from pediatric clinics increased, and new PIH patients may have been more likely to come

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**Table 2. Age distribution of cases treated by PS and non-PS.**

<table>
<thead>
<tr>
<th>Group</th>
<th>&lt;1 y/o</th>
<th>1-6 y/o</th>
<th>&gt; 6 y/o</th>
<th>Total</th>
<th>Average (mean ± SD, months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>11</td>
<td>59</td>
<td>32</td>
<td>102</td>
<td>56.3 ± 38.6</td>
</tr>
<tr>
<td>Group II</td>
<td>a</td>
<td>2</td>
<td>46</td>
<td>30</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>22*</td>
<td>64</td>
<td>36</td>
<td>122</td>
</tr>
</tbody>
</table>

*P<0.001 vs. groups I and IIa
**P<.001 vs. groups IIa and P=0.08 vs. group I
***P=0.07 vs. groups I

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**Fig 1. Distribution of cases in group II.**
to Cheng Ching Hospital because of the presence of a pediatric surgeon. If this be true, then both physicians and parents value the skill of pediatric surgeons. Secondly, the pediatric surgeon operated on a greater number of younger patients. With the presence of a pediatric surgeon, no operation was postponed due to young age or low body weight. Thirdly, because of their subspecialty training, a pediatric surgeon is more likely to detect unapparent silk glove signs of PIH.

Although there are lower incidences of unilateral PIH in girls than in boys, the incidences of bilateral PIH in girls are higher than in boys (30% to 50% in girls; 10% to 15% in boys). Bilateral PIH was operated upon in only 4.9% of cases in group I but 27.4% of cases in group II. Cases were more likely to be identified via physical examination by a PS. In addition, Donellan suggested that both inguinal regions should be explored in girls under 6 years of age. The authors did not follow Donellan's suggestion, but bilateral surgeries were still performed in girls with a possible silk sign.

Although there were more cases with incarceration in group IIb than in group I, the percentages in both groups were similar. Most cases with incarceration were brought to the emergency room due to irritable crying of the child and not due to the parents' awareness of inguinal hernia. Therefore, the effect of subspecialty training was not apparent in such cases.

During our study period there were no postoperative recurrences or complications. This may be due to a small number of cases or a short follow-up period. Although previous studies revealed PIH cases performed by general surgeons resulted in a greater number of complications or recurrences, when general surgeons had a high case volume they achieved similar results to those of a PS. Since regional hospitals do not have a high volume of PIH patients, it is difficult for general surgeons to achieve similar results of a PS.

The addition of a PS to Cheng Ching Hospital resulted in a greater number of PIH patients, younger patients, and those requiring bilateral operations. We suggest that this influx occurred as a result of the presence of a PS in the hospital. Furthermore, the presence of a PS reduced postponement in operations and prevented unnecessary hospital transfers that can increase risk through secondary anesthesia or a hernia that can occur with incarceration. Subsequently, medical care costs were probably reduced. Evidence from this study indicates the importance of surgeons with subspecialty training, and so that we recommend pediatric operations should preferably be performed by surgeons with subspecialty training.

References

小兒外科醫師對處理小兒腹股溝疝氣的影響—以單一醫院的經驗來評估次專科醫師的重要性

林雨利1  張天傑2

雖然大多數的外科醫師都能施行許多種不同類型的手術，但是許多的研究所顯示由次專科醫師來施行較特殊的外科手術對病患會有較好的預後。然而從前的報告都是比較不同醫院中的研究，可能會有不可預知的因素來影響最後的結果。因此本研究藉由小兒外科醫師加入一所區域醫院的經驗，來評估對處理小兒腹股溝疝氣的差異，並以此來呈現次專科醫師對醫療所產生的影響。

研究的結果發現在小兒外科醫師的加入之後，該區域醫院中小兒腹股溝疝氣的病患數目明顯的增加，特別是年幼的病患及兩側的病患。此外對該醫院中一般外科醫師處理小兒腹股溝疝氣的數目有直接的影響，但短期內對泌尿科醫師的影響則較不顯著。這樣的结果顯示，一個接受過次專科訓練的專科醫師的確會對外科手術的施行造成相當的影響，而這些影響會對醫院的運作產生實質的助益。