



Rostrum

## Pediatric Surgery remains the only true General Surgery

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### ARTICLE INFO

*Article history:*

Received 10 July 2017

Accepted 25 July 2017

Available online 12 August 2017

*Keywords:*

Pediatric Surgery

Malformations

Tumors

Trauma

Transplantation

Research

### ABSTRACT

This article states that Pediatric Surgery remains probably the only remaining General Surgery because it is not about organs and systems but rather the whole Surgery from fetal life until completion of growth and maturation.

Pediatric surgeons are currently involved in prenatal treatments for fetal diseases, they take in charge the surgery of congenital malformations, acquired neonatal diseases, common conditions like hernias, undescended testes and appendicitis, but also of the more complex gastrointestinal, broncho-pulmonary or genitourinary conditions, tumors, trauma and solid organ transplantation. For this, like other surgical specialists, they use open, endoscopic and minimally invasive techniques. The broad spectrum of diseases, many of them scarcely prevalent, makes training long and hard, but this challenge accounts for the greatness of this specialty. Pediatric surgeons also carry out research work in their field because they are aware that understanding of why the conditions treated by them occur is mandatory.

In summary, Pediatric Surgery is a lively, exciting, difficult specialty that offers an attractive alternative to young doctors interested in surgery.

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While the tremendous increase of knowledge and the growing complexity of techniques shattered Surgery into several subspecialties, Pediatric Surgery remains true General Surgery.

Why is this? Is it due to the relative youth of this specialty? Is it because of less knowledge or complexity? No. The reason is that Pediatric Surgery is not a subspecialty but rather the Surgery of a period of life. It is not defined by organ or organs treated but like Pediatrics, by the age of the patients until completion of growth and maturation.

This confers to Pediatric Surgery a unique identity since it entails the treatment of surgical diseases of fetus, newborns, infants, children and adolescents altogether. It is true that the bulk of cases is smaller and that the spectrum of conditions has to be larger in order to acquire and maintain expertise.

Pediatric surgeons, like all other specialists, treat a large number of common conditions like hernias, testicular maldescents, appendicitis or phimosis that are the “bread and butter” of our everyday work. However, what is specific of the specialty are congenital malformations. Most of them are relatively rare conditions that may involve every organ of the body and require a deep knowledge of embryology and fetal biology and a top-level expertise. Esophageal atresia,<sup>1</sup> congenital diaphragmatic hernia,<sup>2</sup> anterior abdominal

wall defects like omphalocele or gastroschisis,<sup>3</sup> duodenal<sup>4</sup> and jejuno-ileal atresias,<sup>5</sup> malrotation or anorectal malformations<sup>6</sup> as well as broncho-pulmonary<sup>7</sup> or genitourinary conditions require prompt treatment, delicate surgery and sometimes, additional operations later on in life.

Many malformations are nowadays diagnosed in utero and pediatric surgeons are involved in prenatal counseling and, in a few cases, in prenatal instrumentation or operations. This is true for some neck tumors, massive pulmonary malformations and particularly for spina bifida that clearly benefits of prenatal repair.<sup>8</sup>

But, of course, these malformations are more often managed immediately after birth, when defensive mechanisms, maturity and neonatal biology are different from those of older patients. Until the blooming of this specialty in the middle of the past century, survival and functional results in these particular conditions were very discouraging. Nowadays, survival after repair of esophageal atresia approaches 90%<sup>9,10</sup> and similar figures are possible for most of the other conditions cited, except congenital diaphragmatic hernia in which pulmonary hypoplasia with persistent pulmonary hypertension limits the progress. Nevertheless, this has been immense in the last two decades.<sup>11</sup>

A very rare field that summarizes all these activities and requires the higher levels of expertise is the separation of conjoined twins mainly done during infancy and childhood. Shared organs, complex anatomy and huge technical challenges make these operations a sort of orchestral work in which multiple organ specialists (general,

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<http://dx.doi.org/10.1016/j.pbj.2017.07.003>

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urologic, plastic, orthopedic and cardiovascular pediatric surgeons) work together seeking the best endowment of each member of the set for a separate life of the best possible quality. Fortunately, these complex malformations are rare but its managements illustrate better than any other the complexity of this area of General Surgery.<sup>12,13</sup>

Pediatric surgeons also manage gastrointestinal conditions at all ages including gastro-esophageal reflux, Hirschsprung's disease, inflammatory bowel disease, duplications or vascular malformations of the intestine. And they take care also of thoracic conditions like pulmonary sequestrations, bronchiectasis, spontaneous pneumothorax or parasitic lung cysts.

In many countries, the field of action of Pediatric Surgery also covers all genito-urinary conditions like vesico-ureteral reflux, hydronephrosis, megaureter, urethral valves or reno-ureteral duplications that represent a large share of the case mix.

Trauma is the first cause of mortality below 18 years in developed countries and this explains why Pediatric Surgeons are also involved in this field. Although the trend in Europe and in the US has been to leave fractures into the hands of trauma or orthopedic specialists, in some countries these are treated within our departments and complex thoraco-abdominal trauma involving the respiratory tract and solid and hollow viscera is taken care of in them.<sup>14–16</sup>

Cancer is the second cause of mortality at this age and pediatric surgical departments develop active oncologic activity. Benign soft tissue tumors like teratomas,<sup>17</sup> lymphangiomas, arterial or venous malformations and others are treated by surgery. Malignant tumors of the kidney (Wilms' tumors),<sup>18,19</sup> the neural system (neuroblastoma, ganglioneuroma),<sup>20,21</sup> the germ cells (endodermal sinus tumors) or the soft tissues (sarcomas)<sup>18,22</sup> are also treated by pediatric surgeons. Their participation in pediatric oncologic teams is one of the reasons for the encouraging results obtained in this field in the last decades in which cure rates reach more than 90% for some of them.

Some pediatric surgeons felt that their input was also necessary in the field of organ transplantation and their contribution was crucial to develop some techniques now routinely used in this field.<sup>23</sup> Several teams, including our own developed very active programs of transplantation including all solid organs<sup>24–26</sup> that are fully taken care of by pediatric surgeons with results that match those of the best adult programs in the world. After 700 liver, 300 kidney and 100 small bowel transplantations in our own department, we believe that our specialty has done as well in this field as its adult counterparts.

This broad spectrum of diseases, many of them scarcely prevalent, that require open, endoscopic and minimally invasive surgical techniques makes training a long and hard process. The limited exposure to some of these rare conditions, and the challenge of maintaining top-level expertise accounts for the greatness of this specialty.

And finally, like other specialties, Pediatric Surgery is committed to carry out research work in their field. Understanding why and how the conditions treated by us occur is mandatory to optimize their management. And if we do not interest other scientists in these conditions, many issues will remain unresolved.

Separation of several subspecialties within Pediatric Surgery is a probably unavoidable trend in the immediate future, but those tempted by this should keep in mind that there is some risk in restricting the field of application of their skills to a progressively

smaller number of individuals with the ensuing difficulties to maintain and teach expertise.

In summary, Pediatric Surgery is a lively, exciting, difficult specialty that offers an attractive alternative to young doctors interested in truly General Surgery.

### Conflicts of interest

The author declares no conflicts of interest.

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