



## Original Article

# Surgical results from treating children with syndactyly through the collective effort system at “SOS Hand Recife” between 2005 and 2009<sup>☆</sup>



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## ABSTRACT

**Objective:** to evaluate the results from and parents' satisfaction with treatment for children with syndactyly who were operated at the “SOS Hand Recife” hospital between 2005 and 2009.

**Methods:** data for assessing the results were gathered from the patients' medical files. The subjective scores, which were ascertained prospectively, were as follows: greater than or equal to 9, good result; between 6 and 8, fair result; less than 6, poor result. The results were analyzed statistically. This study was approved by the institution's ethics committee.

**Results:** among the 35 cases, 21 (60%) consisted of simple syndactyly and 14 (40%) were complex; 22 (62.8%) were boys and 13 (37.1%) were girls. The complex cases were predominantly among males. The main complications were infection (11.4%), bleeding (11.4%) and pain (8.6%). There were more complications in the complex cases (42.8%) than in the simple cases (33.3%). The mean scores from the parents' subjective evaluations were as follows: 7.6 for esthetics (7.7 in simple cases and 7.3 in complex cases); 8.2 for function (8.6 in simple cases and 7.6 in complex cases); 8.3 for the parents' general satisfaction level (8.6 in simple cases and 8.0 in complex cases); and 85.7% of the parents would recommend the surgery to others while 14.5% would not. A strong association was observed between the specialist's objective assessment and the scores given by the parents ( $p < 0.05$ ).

**Conclusion:** the surgical results from treating syndactyly presented differences between the simple and complex types, even though the parents' esthetic evaluations and satisfaction were similar.

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## Resultados cirúrgicos do tratamento de crianças portadoras de sindactilia operadas em sistema de mutirão no SOS Mão Recife entre 2005 e 2009

### R E S U M O

#### Palavras-chave:

Deformidades congênicas da mão  
Sindactilia  
Retalhos cirúrgicos  
Criança

**Objetivo:** avaliar resultados e satisfação dos pais quanto ao tratamento de crianças portadoras de sindactilia operadas entre 2005 e 2009 no Hospital SOS Mão Recife.

**Métodos:** foram coletados, nos prontuários, os dados para avaliação dos resultados. Os escores subjetivos, verificados prospectivamente, foram: igual ou superior a 9, bom resultado; entre 6 e 8, resultado regular; abaixo de 6, mau resultado. Os resultados foram analisados estatisticamente. A pesquisa foi aprovada pelo Comitê de Ética da Instituição.

**Resultados:** dos 35 casos, 21 (60%) foram sindactilias simples e 14 (40%) complexas; 22 (62,8%) eram meninos e 13 (37,1%) meninas. Houve predominância masculina nos casos complexos. As principais complicações foram: infecção (11,4%), sangramento (11,4%) e dor (8,6%). Ocorreram mais complicações nos casos complexos (42,8%) contra 33,3% nos simples. A avaliação subjetiva dos pais revelou: quanto à estética, média de 7,6, porém com média de 7,7 nos casos simples e 7,3 nos complexos; na função, a média foi de 8,2, 8,6 e 7,6, respectivamente, nas simples e nas complexas; em relação ao grau de satisfação dos pais, 8,3 (geral), 8,6 e 8 respectivamente; sobre a possibilidade de os pais recomendarem a cirurgia a outros, 85,7% recomendariam, contra 14,3% contrários. Foi observada forte associação entre a avaliação objetiva do especialista e os escores atribuídos pelos pais ( $p < 0,05$ ).

**Conclusão:** os resultados cirúrgicos da sindactilia apresentam diferenças entre os tipos simples e complexo, apesar de o aspecto estético e a satisfação dos pais serem semelhantes.

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## Introduction

Hands perform important sensory and dynamic functions. Congenital or acquired hand diseases may significantly affect humans' professional abilities and social lives. Among the commonest congenital hand diseases is syndactyly, which may account for almost half of such abnormalities. Its incidence is approximately one case in every 2000–3000 live births.<sup>1–5</sup> Approximately 41% of these cases are bilateral<sup>3–5</sup> and there is often a family history of such cases.<sup>1</sup> Syndactyly causes not only a cosmetic defect but also joint contractures, given that the skin that connects the phalanges to the joints is located at several levels and is frequently poorly positioned.<sup>6</sup>

The treatment for children with syndactyly is surgical and its aims are to improve the appearance and function of the hand and to avoid progressive deformity in the developing human being. The operation is generally performed when the child is around four years of age. The older the child is, the greater the hand dysfunction is and the longer the rehabilitation time needed will be. Conventional surgical treatment for syndactyly of the hand is performed using various plastic surgery techniques, generally including use of skin flaps. The problems with this treatment include trophic alterations in the transferred flaps and trauma in the donor area. The surgical treatment may vary according to the type of syndactyly, i.e. whether it is simple or complex, and also whether it is partial or complete. The results vary as a function of greater or lesser complexity of the syndactyly. They are worse when bone structural alterations are present.<sup>6–15</sup>

External fixators for increasing the skin area, with the aim of avoiding use of flaps, have been used since 1979 and have presented evolution in their technical aspects and results.<sup>6</sup>

Although most cases of syndactyly are congenital, acquired cases also exist, frequently caused by burns. Likewise, release of fingers is surgical and requires appropriate plastic surgery techniques.<sup>15–17</sup>

Evaluations on the results from surgical treatment of syndactyly of the hand are usually done based on the clinical findings.<sup>7</sup> Nevertheless, images obtained through computed tomography may aid in making the evaluation more systematic.<sup>18</sup>

Surgical treatment for congenital or acquired syndactyly is carried out at plastic surgery or hand surgery services, on an elective basis. Good results from surgical treatment of congenital syndactyly, without functional limitations of the hand, are reported in around 60%–80% of the cases. Nonetheless, esthetic abnormalities, hypertrophic scars,<sup>19</sup> hyperpigmentation of the skin flap used and possible flexion of the finger in contracture have been reported.<sup>20</sup> The cosmetic and functional results are generally excellent in simple cases.<sup>21</sup> In complex cases, the postoperative prognosis depends on the severity of the bone, tendon or joint abnormalities.<sup>22</sup>

There is a scarcity of reports on the surgical results from treating syndactyly of the hand. We only found two case series in the Brazilian literature, which used different techniques and presented limited numbers of patients.<sup>7,8</sup> In this regard, reporting on the results from a larger series with different types of syndactyly and different possibilities for surgical techniques is justified. In addition, the results reported in the present study are from patients who were operated under

the collective effort system in “humanitarian missions” at the “SOS Hand” hospital in Recife, in partnership between hand surgeons of this institution and hand surgeons from France, with sponsorship from La Chaine de L’Espoir (“chain of hope”). Moreover, the results from the treatments effected would be evaluated with longer follow-ups than those usually reported in the literature.

The aim of the present study was to evaluate the results from surgical treatment of children with syndactyly who underwent operations through the collective effort system in “humanitarian missions” at the “SOS Hand” hospital in Recife, between 2005 and 2009.

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## Materials and methods

All children with syndactyly who were operated under the collective effort system at the “SOS Hand” hospital in Recife, between 2005 and 2009, were included.

Data identifying the patients operated over the study period and making it possible to locate them were gathered from the hospital’s medical and statistical filing service (SAME). These patients were then invited, as volunteers, to undergo evaluation of the results from the surgical treatment on their congenital hand diseases (syndactyly). The following information relating to the patients’ control characteristics was gathered: age; sex; weight; height; signs, symptoms and physical and radiographic findings before the surgery; different types of syndactyly; descriptions of the surgery, including the technique used, types of flaps and types of grafts, along with perioperative and postoperative complications; use of physiotherapy; and need for additional surgical procedures.

It was noted whether the patient had syndactyly as an isolated congenital disease or whether it was part of the manifestations of components of syndromes such as Apert or Poland, among others. On the other hand, for the purposes of qualifying the results, the cases of syndactyly were stratified into two groups: in the first, those in which the bone structure of the fingers was normal; and in the second, those in which the fingers presented skeletal abnormalities.

The evaluation on the results was done in accordance with the following protocol:<sup>7</sup>

Good result – Adequate interdigital space (normal conformity, similar to normal fingers) with skin of normal appearance; possibility of superimposing one finger on another; flap placed during surgery is intact, without loss of skin or graft; absence of abnormal healing; and completely normal functioning of the fingers.

Fair result – Inadequate interdigital space, with abnormal appearance; difficulty in superimposing one finger on another; partial loss of the flap or interdigital skin; need for skin grafting; and abnormal healing.

Poor result – Absence or abnormality of interdigital space; impossibility of superimposing the released fingers; total loss of the flap or graft; abnormal healing or need for skin grafting; and total loss of finger functioning.

Scores greater than 9 corresponded to an objective evaluation that the result was good; those from 6 to 8 corresponded to fair results; and those below 6 corresponded to poor results.

The same was a convenience sample and included patients who accepted the invitation and, after receiving explanations, signed the free and informed consent statement.

The qualitative variable results were expressed in terms of their absolute and relative frequencies. The results relating to the quantitative variables were expressed in terms of their means and standard deviations. The chi-square test was used to evaluate possible associations.  $p < 0.05$  was taken for rejecting the hypothesis of nullity.

This project was approved by the ethics committee of the “SOS Hand Recife” hospital and was ratified by the ethics committee of the Altino Ventura Foundation. All the adults responsible for these children who were involved in the investigation received the clarifications needed for understanding the study, and they signed the free and informed consent statement.

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## Results

Out of the 35 cases operated over the period studied, 21 (60%) were classified as simple syndactyly and 14 (40%) as complex syndactyly. In relation to gender, 22 (62.8%) were male and 13 (37.1%) were female. There was male predominance among the complex cases: 10 (71.4%) versus four (28.2%); and greater homogeneity of distribution in the simple cases, with 12 male cases (57.1%) and nine female cases (42.8%).

The age at which the first surgery was performed ranged from 16 to 204 months, with a mean of 73.7. The mean was 69 months among the simple cases and 80.8 among the complex cases.

In relation to the duration of the surgical procedure, there was a range from 30 to 150 min, with a general mean of 99.4 min. There was a difference in duration between the simple cases (87.6 min) and the complex cases (117.1 min). The length of follow-up ranged from 12 to 108 months, with a mean of 23.6.

Considering all the cases together, 22 (62.8%) did not have any complications. The remainder had the following main complications: infection (11.4%), bleeding (11.4%) and pain (8.6%), with other complications that accounted for 5.7% (hypertrophic scar and extrusion of Kirschner wire). In analyzing the two groups separately, we observed that there was a higher percentage of complications in the complex cases (42.8%), versus 33.3% in the simple cases. There were considerably greater levels of infection and bleeding in the complex series (14.3% and 21.4%, respectively), versus 9.5% and 4.8% in the simple series, respectively. The frequency of pain was similar in the complex cases (7.1%) and simple cases (9.5%). Two cases (9.5%) in the simple series had other complications, as already reported above.

Regarding the results from the parents’ subjective evaluations, there was a range of scores from 0 to 10 for esthetics, with a mean of 7.6 (mean of 7.7 for the simple cases and 7.3 for the complex cases); in the functional analysis, the means were 8.2, 8.6 and 7.6 respectively, with a range of scores from 3 to 10; in relation to the parents’ degree of satisfaction, means of 8.3, 8.6 and 8 respectively, with a range from 2 to 10; regarding the possibility that the parents might recommend this procedure

**Table 1 – Distribution of scores from the objective medical evaluation and the parents' subjective evaluation.**

Classification	Syndactyly			
	Simple (n = 21)		Complex (n = 14)	
	Objective	Parents	Objective	Parents
Good	6	9-10	4	10
Fair	11	6-8	6	6-8
Poor	4	0-5	4	2-5

**Table 2 – Kappa concordance table for the parents' or guardians' subjective evaluation and the objective evaluation by hand surgeons.**

	Good	Parents			Kappa
		Fair	Poor	Total	
Physicians	10	0	0	10	0.868
	2	14	1	17	0.770
	0	1	7	8	0.838
Total	12	15	8	35	0.822 (General)
	p value			95% confidence interval	
Good	<0.001			≥1 to ≤0.54	
Fair	<0.001			≥1 to ≤0.441	
Poor	<0.001			≥1 to ≤0.507	

to others, the results were equal: 85.7% would recommend it, versus 14.3%.

The objective results and the scores attributed by the parents are laid out in [Table 1](#).

There was strong concordance between the parents' or guardians' subjective evaluations and the objective evaluations of the hand surgery specialists ([Table 2](#)).

## Discussion

Analyzing surgical results from children is always challenging.<sup>3-5</sup> Among the classification systems for functional evaluations of the hands that exist, none of them is easily applicable to children, given the complexity of such cases and the need for collaboration from the patients,<sup>7</sup> along with the possible neuropsychomotor developmental delays and syndromes that may also be influenced. It is therefore of interest to obtain additional evaluation of the surgical results by the children's own parents.

Among the 35 cases analyzed here, male patients predominated (62.85%), as also seen in the literature consulted. The patients' mean age at the time of the operation (73.74 months) suggests that there was a lack of specialized medical care for these patients and that this influenced the duration of the operation, complication rate and prognosis, since we believe that children operated before the age of one year have a better prognosis regarding function. The mean length of follow-up was 23.57 months, which was a reasonable period, especially considering the low socioeconomic level of most of these families, and also in relation to the worldwide literature.

With regard to the duration of the operation, it was observed that complex cases of syndactyly required longer

operations (117.14 min), possibly because of the greater level of difficulty in correcting the deformities. This may also have influenced the high frequency of complications: 42.8% versus 33.3% in simple cases. It was also observed that the infection and bleeding rates were higher in the complex cases (14.3% and 21.4%, respectively) than in the simple cases (9.5 and 4.8, respectively). The fact that these children were operated by different surgeons and, moreover, that residents undergoing training also participated may have interfered in the duration of the operation, as a form of bias.

Regarding ethical issues, little difference was noted between the groups. However, regarding function, the scores given by the parents were greater in the simple group (8.6) than in the complex group (7.6), probably because of the less favorable prognosis for complex cases of syndactyly, which lead to earlier joint deformities. Despite the latter analysis, the parents' degree of satisfaction was similar in the two groups: 85.7% would recommend the surgical procedure or would even accept possible additional surgery.

Our position is that in simple cases of syndactyly, the functional results are superior to those found in complex cases, even though the ethical issues and parents' degree of satisfaction are similar in the two types of cases. For better comprehension of this disease and its surgical results, we believe that with standardization of the age for indicating this surgery, and also the subsequent surgery. Use of the same surgical technique and a well-defined postoperative protocol may produce enriching conclusions that contribute toward understanding this entity.<sup>1-5</sup>

## Conclusion

The surgical results from children with syndactyly present differences between the simple and complex types regarding functional issues, although the esthetic issues and parents' degree of satisfaction are similar.

## Conflicts of interest

The authors declare no conflicts of interest.

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