Review Of Activity For Five (5) Years (2014-2018) Of Pediatric Plastic Surgery At The Chu Aristide Le Dantec Hospital In Dakar - Senegal

M FOBA, A Ndiaye, M Ndiaye, L Ndiaye, A Sankale

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Abstract

Background

Pediatric plastic surgery is a relatively recent specialty, at the crossroads of several fields. It requires good theoretical and practical knowledge. The aim of this study was to and to identify the skills needed in the routine practice of a pediatric surgeon.

Methods

We performed a retrospective analytical study over five years between January 1, 2014 and December 31, 2018 at the Plastic and Reconstructive Surgery Department of Aristide Le Dantec teaching hospital in Dakar. We included all children aged 0-15 who consulted at the department during the study period. The observed parameters were epidemiological, clinical, diagnostic, therapeutic and evolutional.

Results

A total of 824 children were included, i.e. 43,97% of the overall activity of the department, with a mean age of 5,02 years and a sex ratio of 0.8. Referrals constituted 34,95% of the patients and 315 children consulted for aesthetic reasons. Post-burn contractures were the most common condition, observed in 220 patients (26, 7%), followed by facial clefts and craniofacial abnormalities in 140 patients (17%), and keloids and hypertrophic scars in 131 patients. A total of 735 children underwent treatment (89, 2%) and the most common therapeutic methods were skin flaps for 326 patients and skin grafts for 221 patients. Physiotherapy was combined with surgical treatment for 108 patients. Post therapeutic complications were found in 57 children, contracture recurrence and palatal fistulae in 22, 82% and 15, 84% respectively.

Conclusion

Pediatric plastic surgery is a complex medical specialty still little known in French-speaking Sub-Saharan Africa, especially in Senegal. Hand burn sequelae were the most frequently found condition in our study. Surgical treatment consisted predominantly of skin flaps and grafts. Complications were rare.

INTRODUCTION

Pediatric surgery is a surgical specialty that cares for children from the neonatal period to adolescence, specifically from birth to 15 years.

Plastic surgery is the surgery of the skin and non-visceral soft tissues.

Children are not miniature adults, but adults in the making. They have a specific physiology and diseases that are different from those of the adult, requiring techniques and approaches specific to them. The development of this branch of medicine has led to a considerable reduction in infant morbidity and mortality in the surgical setting, some of the causes of which seemed to be due to inexperienced management of developing organisms. While the improvement of this health indicator has been on the rise for

almost a century in developed countries, Africa is still struggling to meet the challenge. As far as progress in plastic and reconstructive surgery is concerned, the situation remains the same on the continent, with a glaring deficit especially in French-speaking Sub-Saharan Africa.

Nowadays, pediatric surgery is more refined, meticulous and precise, as it lies at the crossroads of various specialties. In addition, new fields of possibility are to be exploited, in particular the hyper specialization of the pediatric surgeon in the fields of plastic surgery, orthopedics, traumatology or visceral surgery. In the case of plastic surgery, which encompasses the notions of aesthetics, reconstruction and repair, it is becoming imperative to increase the training strategies of pediatric surgeons in this field.

To the question: What health for the African child in the third millennium, we should certainly add: what aesthetic and reconstructive approaches? Indeed, a child who has undergone surgery will grow up with his scar and its after-effects. A need for reconstruction in the young child could turn into an aesthetic demand in adulthood. In a society where the concept of beauty is modulated by the gaze of others, pediatric plastic surgery is proving to be one of the most beautiful jewels of pediatric surgery, with a major corollary: the updating of the knowledge and technical skills of the child surgeon as a factor of dynamism and progress. This in order to prepare the pediatric surgeon to know how to smartly use a therapeutic arsenal in constant evolution for purposes of reconstruction.

Therefore, in order to bring a contextual look at the reality of Senegal, we have given ourselves the objective of conducting a retrospective study over five (5) years of pediatric plastic surgery practice, from 2014 to 2018, within the Aristide le Dantec Hospital in Dakar. The objective of this study is to determine the scope of practice of pediatric plastic surgery and to define the skills to be developed in the routine practice of a pediatric surgeon.

PATIENTS AND METHODS

I.1 Patients

I.1.1. Study period

It was a retrospective and descriptive study over a period of five (5) years, from January 1, 2014 to December 31, 2018, listing all the children seen in the Plastic, Reconstructive and Aesthetic Surgery Department of Aristide Le Dantec Hospital.

I.1.2. Inclusion criteria

All patients aged 0 to 15 years who received care in the Department of Plastic, Reconstructive and Aesthetic Surgery of the Aristide Le Dantec Hospital in Dakar during the study period were included in our study.

I.1.3. Non-inclusion criteria

The following were not included in our study:

- patients who had neither a reconstructive nor an aesthetic request as a reason for consultation

- referral mistakes,

- patients older than 15 years.

I.1.4. Study population

The study population consisted of children aged 0 to 15 years who consulted at the department during the study period.

I.2 Methods

I.2.1. Data collection

The data was collected by analyzing the patients' handwritten and electronic medical records.

A pre-established survey form was used to collect patient information grouped by items (see appendix).

The operational definitions were:

- Keloids and hypertrophic scars

- Facial clefts and craniofacial malformations: partial or total amputation of one of the elements of the facial skeleton

- Tumors: cyst, nevus, glandular tumor, lipoma, skin tumors (excluding keloids), angioma and hemangioma.

- Congenital conditions of the hand: arthrogryposis, congenital syndactyly, polydactyly, macrodactyly, amniotic band syndrome.

- Breast conditions: gynecomastia, benign breast hypertrophy, phyllodes tumor, Poland syndrome.

- Post-burn retractions: contractures and any other commissural or skinfold defect following a burn.

Diagnoses not covered by this coding system have been classified in a subgroup named "other".

I.2.2. Parameters

The analyzed parameters were epidemiological, clinical, therapeutic and evolutionary, including:

- Patient's identity

- Age: the patients were divided into 5 age groups.

- Sex

- chief complaint

- Frequency

- Referral

- Final diagnosis

- Therapeutic options

- Results

- Complications.

I.2.3. Data analysis

Data collection and analysis were performed with computer software Epi-info 7.2.1.0, SPSS, Microsoft Excel® 2010. Word processing was performed using Microsoft Word® 2010.

RESULTS

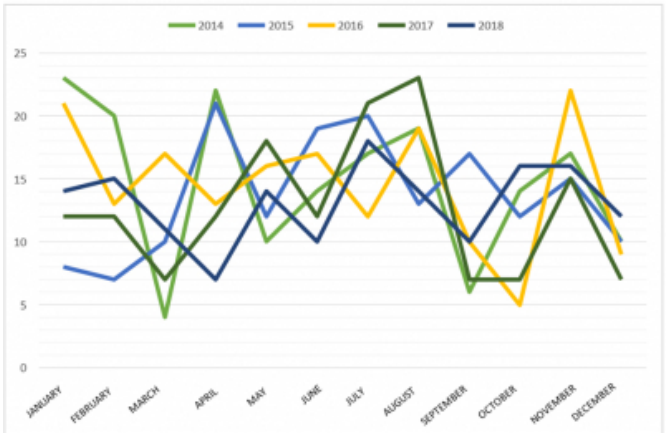
II.1 Epidemiology

II.1.1. Frequency

During the study period, one thousand eight hundred and seventy-four (1874) patients were seen in plastic surgery consultations, of which eight hundred and twenty-four (824) were children; which represents 43.97% of the overall activity, or an average of three (3) new children per week.

Figure 1

Distribution of patients by month



II.1.2. Age

The mean age of our patients was 5.02 years (range 1 day-15 years).

The median age of our patients was 3 years. Twenty-five percent (25%) of the patients were younger than 14 months and the remaining 75% were younger than 8 years old. We report in Table I the distribution of patients by age groups.

Table 1

Distribution of patients by age group

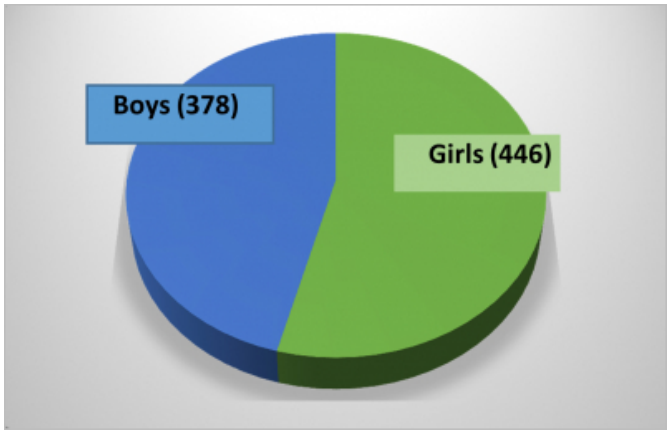
Age groups	n	%
0-28 days	24	2,91
29 days-30 months	**352**	**42,72**
31 months-5 years	147	17,84
6 - 10 years	158	19,18
11 - 15 years	143	17,35

II.1.3. Sex

We had a total of 446 girls and 378 boys, for a sex ratio of 0.8.

Figure 2

Distribution of patients by gender



II.1.4. Referrals

The patients came directly from their homes in 65.05% (n=536) of cases.

Referrals accounted for 34.95%, i.e. 288 children, 161 of whom came from the pediatric surgery departments of Aristide Le Dantec hospital and Albert Royer children's hospital.

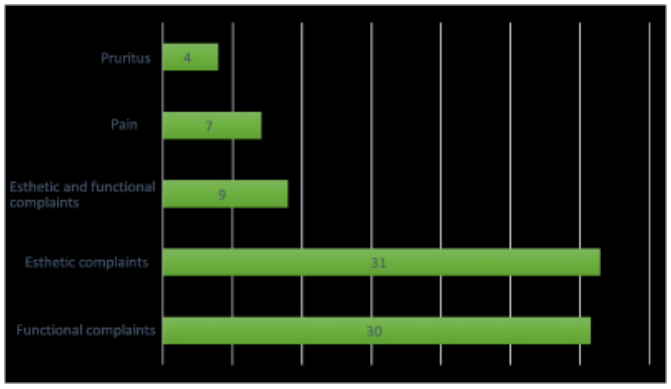
II.2 Clinical aspects

II.2.1. Chief complaint

The patients' complaints were functional and/or aesthetic, pain and pruritus (Fig. 3).

Figure 3

Distribution of patients according to complaints



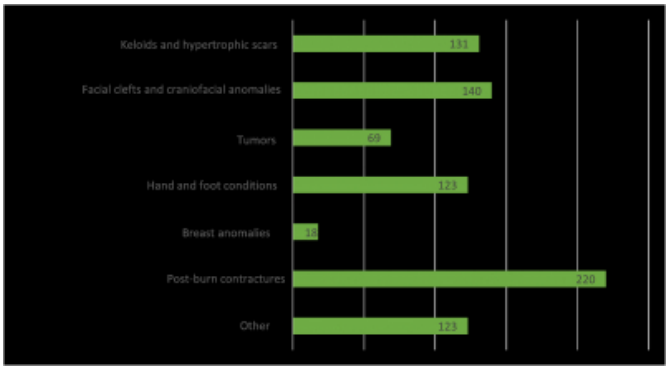
II.2.2. Diagnosis

We classified the diagnoses in seven (7) major groups (Fig. 4).

Post-burn retractions were the most prevalent, accounting for 26.7%, of which the majority were hand flaps, which accounted for 72.3% of this diagnostic subgroup. The second more prevalent group was facial clefts and craniofacial abnormalities (17%), then keloids and hypertrophic scars (15.9%).

Figure 4

Distribution of patients according to conditions



We report in Table II the more prevalent conditions.

Table 2

Most common conditions observed during the study period

Conditions	Diagnosis	n
Facial clefts and craniofacial anomalies n=140	Cleft lip	31
	Cleft palate and palatal fistula	48
	Cleft lip and palate	40
	Facial cleft	3
	Cranio-facio-stenosis (Apert syndrome)	3
	Anomalies of the eyelids, ears and nose (ectropion, embryonic remnants of the ear, nasal synechiae, upper lip ties)	15
Keloids and hypertrophic scars n=131	Keloids	80
	Hypertrophic scars	57
Post burn contractures n=220	Contractures of the hand	159
	Contractures of the upper limb	35
	Contractures of the lower limb	25
	Genu flexum	1

The other four (4) groups of conditions are presented in Table III. These are:

- Breast anomalies in 2.2% of cases

- Hand and foot conditions in 14.9% (congenital abnormalities, traumatic injuries and scars)

- Tumors in 8.4%.

- Other affections in 14.9%.

Table 3

Less common conditions observed during the study period

Conditions	Diagnosis	n
Hand and foot conditions n=123	Congenital syndactyly	17
	Arthrogryposis	2
	Macrodactyly	12
	Camptodactyly	6
	Polydactyly	22
	Amniotic band syndrome	22
	Scar contracture (bite, phlegmon)	32
	Limb agenesis	1
	Limb deformities (bifid thumb, bifid toe,trigger finger, ectrodactyly, brachydactyly)	9
Breast anomalies n=18	Gynecomastia	6
	Phyllodes tumor	2
	Juvenile breast hypertrophy	3
	Poland Syndrome	2
	Lipodystrophy	1
	Breast lumps	4
Tumors n=69	Naevus	5
	Cyst	8
	Lipoma	4
	Angioma	25
	Neurofibromatosis	14
	Benign tumors (eccrine angiomatous hamartoma,molluscum)	13
Others n=123	Soft tissue loss (post-traumatic, pressure ulcers)	39
	Burns	36
	Chronic ulcer	6
	Unsightly scar	22
	Polymalformative syndrome, circumcision accident, amputation (post-traumatic, post-burn, animal bite), lymphangioma, clitoral hypertrophy, urological trauma sequelae	20

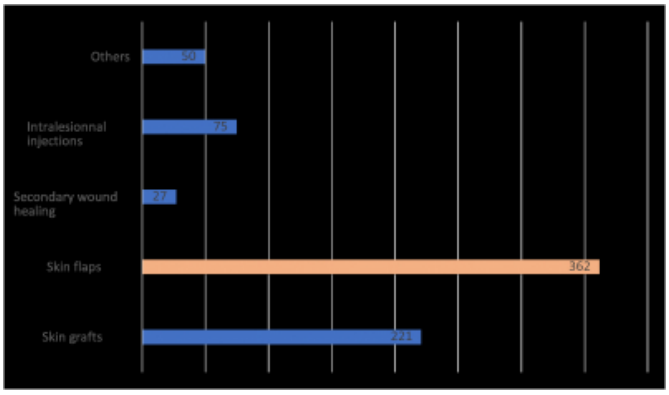
III.2 Treatment

During the study period, eight hundred and twenty-four (824) children were seen in the Plastic and Reconstructive Surgery Department of Aristide le Dantec Hospital. Seven hundred and thirty-five (735) children underwent treatment and eighty-nine (89) were not treated in the department, i.e., 89.2% of the children underwent treatment and 10.8% of the children did not.

The different types of treatment underwent by the patients (Fig. 29) were flaps, skin grafting, intralesional injections, secondary wound healing and other techniques not specific to plastic surgery. (Fig. 5)

Figure 5

Treatment modalities



Flaps were the most common surgical procedure performed. Cheiloplasty and staphylorrhaphy, for the treatment of cleft lip and palate, represented 22.1% (n=80) of the total number of flaps. (Table 7)

Table 4

Other surgical procedures

Procedures	n
Surgical removal	20
Supernumerary digit removal	17
Amputation	5
Finger pinning	3
Arthrodesis	5

The 20 cases of surgical removal were for cysts (8 cases), tumors (8 cases) and lipomas (4 cases).

Surgical treatment was combined in 108 cases with an adjunctive treatment including physiotherapy procedures. These procedures were:

- Pressure therapy with silicone gel and compression garments

- Scar massage

- Splints and orthoses

- Active and/or passive functional rehabilitation.

Surgical removal of keloids was followed by an intralesional injection protocol of corticosteroids (Triamcinolone) every twenty-one (21) days in 80% of cases. Eighty-nine (89) children benefited from interdisciplinary management.

Table V shows the management strategy in each case.

Table 5

Management of patients who did not undergo surgery during the study period

Diagnosis	n	Management
Partial traumatic ear amputation	1	Therapeutic abstention
Hand and/or foot amputation	3	Proposal for orthopedic fitting
Congenital absence of the sternum	1	Therapeutic abstention
Amniotic band syndrome (complete finger amputation)	3	Proposal for orthopedic fitting
Left upper limb agenesis	2	Therapeutic abstention
Molluscum contagiosum	5	Referral to dermatology department
Facial cleft	5	Reassessment
Unilateral breast hypertrophy	1	Reassessment
Unsightly scar of the face	11	Therapeutic abstention
Hypertrophic scar	6	Massage
Cleft lip and palate	19	Renutrition / Smile Train Cleft surgery program
Bone tumor with amniotic band	1	Referral to pediatric surgery department
Cleft palate	7	Reassessment
Facial angioma	7	Monitoring
Noma sequelae	1	Referral maxillofacial surgery department
Limb agenesis	6	Proposal for orthopedic fitting
Congenital syndactyly	1	Reassessment
Arthrogryposis	2	Physiotherapy
Neurofibromatosis	2	Reassessment
Venolymphatic malformation	3	Referral to cardiothoracic surgery department
Cyst of the concha and umbilical hernia	1	Referral to pediatric surgery department
Diffuse abdominal lipomatosis	1	Monitoring

III.3 Evolution

Treatment outcomes were favorable in 92.25% of cases (678 children). Complications were observed in 57 patients (Table VI)

Table 6

Post therapeutic complications

Complications	n	%
Weight gain (intralesional corticosteroid injection)	9	15,79
Hypopigmentation (intralesional corticosteroid injection)	7	12,28
Hand contracture recurrence	13	22,82
Palatal fistula	10	15,54
Partial graft lysis	5	8,77
Necrosis of amputation stump	5	8,77
Tendon contracture	3	5,26
Keloids	5	8,77
Total	57	100

DISCUSSION

III.1 Epidemiology

III.1.1. Frequency

Children represented 43.97% of all patients seen in the department of plastic surgery.

There was no seasonal peak or increase in the number of patients at specific times of the year.

Pediatric surgery cares for children aged 0-15 years [23, 49, 62, 72]. Pediatric plastic surgery has only emerged as a separate specialty in the last few decades [31]. In some countries, such as Canada and Switzerland, patients are managed by pediatric departments up to the age of 18. In other countries, where the specialty is growing rapidly, there is little distinction between children and young adults, in order to develop the surgical skills of general surgeons [74].

The existence of referral centers for pediatric plastic surgery makes it difficult to estimate the exact proportion of children to adults [31] in routine practice. This is further reinforced by the emergence of microsurgery over the last few decades or of large centers for the management of burns [30, 68], thus dividing the specialty into different sub-units.

In French-speakingSub-Saharan Africa, especially in countries members of the African and Malagasy Council for Higher Education (CAMES), few plastic surgery departments meet the criteria of the Inter-African Advisory Committee (IAC) [80]. And we have not found any comparative analysis of the proportions of child to adult activities.

Pediatric plastic surgery patients are seen in pediatric, orthopedic, or general surgery departments.

However, a study conducted in Zambia in 1993 by Nath [47] in a plastic surgery referral center, based on an analysis of 13 years of activity, revealed a proportion of 19.75% of pediatric plastic surgery procedures. Kouakou [37] in the Ivory Coast found a proportion of 5.10% of cases (26 patients) of plastic surgery, over a period of 13 years, out of a total of 509 patients, in a pediatric surgery department. These disparities in numbers can be explained by the fact that the population, the duration of the study period, and the study setting are different from ours. In Zambia, the study was conducted in a plastic surgery referral hospital and in Ivory Coast in the pediatric surgery department of a public hospital.

The data reported by Djagbare [23] and Nigobora [49] in the regional hospitals of Ziguinchor and Saint-Louis in Senegal, respectively, do not mention any pediatric plastic surgery activity, over periods of 6 months, in a pediatric population of 174 and 761 children, respectively. Which shows that plastic surgery activities are performed primarily in the

teaching hospitals of Dakar, the capital.

In Nigeria and Ghana, where there have been residency programs for plastic surgeons since the 2000s [24, 28, 50], we did not find a review of combined adults and children activity. However, the diversity and expansion of plastic surgery training programs since the establishment of these systems should be highlighted.

III.1.2. Age and sex

The mean age of our patients was 5.02 years with a sex ratio of 0.8.

Three hundred and fifty-two (352, representing 42.72%) patients were between 29 days and 30 months of age, and 75% of our study population was under 8 years of age.

Since pediatric plastic surgery cares for children, we compared our results with those of other pediatric series, in order to determine the predominance or not of gender and/or age group. We report in the following table VII the comparative proportions of different series:

Table 7

Studies comparison. Mean age and sex ratio.

	DJAGBARE [23]	NIGOBORA [49]	KOUAKOU [37]	Our study
Mean age	6.7 years	7 years		5,02
Sex-ratio	1.88	2.04	1,43	0.8

A comparative study of these three studies reveals that the pediatric conditions, in general, are more common in young boys than in girls. However, the mean age is similar to that found in our study.

The predominant age range of 29 days to 30 months is also found in the study of Kouakou [37] in Ivory Coast.

It should be noted that studies targeted at groups of conditions such as keloids [7, 78, 79] and cleft lips [43, 61]; found a predominance of affected females. Therefore, at this stage, it is not necessary to consider a male predominance for all pediatric plastic surgery conditions.

III.1.3. Referral

Our study reveals that 65.05% of the patients came directly from their homes, which suggests a fairly good knowledge of the existence of the Plastic Surgery department.

A study conducted in India by Agarwal [3], on 4 groups of individuals, revealed a knowledge of plastic surgery activities by the general population, of the order of 50%, with as first indication the management of burns followed by that of congenital conditions. The source of this information would be primarily television and newspapers. The knowledge of health care workers was almost identical to that of the general public.

In Nigeria, Adeyemo [1], in a study similar to that of the Indians, showed a knowledge of plastic surgery activities in the order of 78.5%, by both the public and private sector professionals not working in the medical field.

Several authors [1, 3, 63, 71] agree that the media, with "reality shows" in the forefront, provide a patchy knowledge of plastic surgery. Plastic and reconstructive surgery in children has many facets. It includes: congenital malformations of the child, reconstruction and repair surgery after accidents or cancer, hand surgery, burns and burn sequelae, microsurgery ... from head to toe.

In Senegal, where there is only one plastic surgery department, health care workers, especially those in pediatric and general surgery departments, have only an average knowledge of plastic surgery. A wider awareness would certainly increase the number of referred patients, which in our study is about 34.95%.

III.2 Clinical characteristics

III.2.1. Chief complaint

The patients in our series came to the department for both functional and aesthetic reasons.

Kouakou [37] found that 42% of patients had a functional issue. The aesthetic need was not precisely expressed in his study population.

The study by Onah in Nigeria in 2010 [51], reported only 1.06% of aesthetic complaints on all consultations, during 5 years, on a population comprising both children and adults.

Various authors report [1, 3, 10, 45] that there is an increasing number of children resorting to cosmetic surgery, a request clearly formulated by the patients themselves or by the parents, because of society's influence on body image. In

our study, the aesthetic demand was mostly for reconstruction for burns sequelae and unsightly scars.

III.2.2. Diagnosis

Burns sequelae in the form of post-burn contractures represented 26.7% of the children seen in the plastic surgery department, among whom we found 159 cases of post-burn contractures of the hand, i.e. 72.5%.

Nath's study found a proportion of 28.2% of post-burn retractions, of which 43% represented minor and major contractures of the hand. A study conducted in Ghana by Adu [26] on post-burn contractures in a heterogeneous population of adults and children revealed a proportion of 40.3% of contractures of the hand.

Moujahid in Morocco [45] found 50 cases (70%) of post-burn contracture of the hands over a period of 16 years.

Children discover their environment with their hands, and the first explorations and games are carried out by bringing everything their hands grasp to their mouths. This may account for the fact that burn injuries are mainly found in the hands, especially in the under-8 age group [2, 45, 47].

After the contracture-type burn sequelae, we found a percentage of 17% of facial clefts and 15% of keloids and hypertrophic scars in our series. Our results are not similar to those of Nath in Zambia, who found 28% and 2% respectively.

In Senegal, joint missions between our Plastic Surgery Department and the NGO "Smile Train" have been carried out for nearly 10 years, allowing the treatment of cleft lip and palate in children and adults. The low percentage of cases compared to the Nath study is attributable to the fact that the team working on these humanitarian surgery missions is from the Plastic Surgery Department of the Aristide Le Dantec Hospital.

A study conducted in Ghana by Agbenorku [4] in 2013 on orofacial clefts found 1 cleft for 763 live births over a period of 2 years, which makes these defects the most frequently found in the population of Kumasi.

Regarding keloids, a recent study conducted in 2018 by Yonga [79], in the plastic surgery department of the Aristide Le Dantec Hospital, found 206 keloids on children over a period of 16 years (January 2002 - December 2017). Whereas in Ivory Coast Allah and al. found 149 lesions over a period of 21 years in a heterogeneous population (adults and children) [5]. In light of these different numbers, it should certainly be noted that keloids on black skin are one of the most common skin tumors found in our practice, which have been also observed by other authors [5, 79].

TREATMENT

Our study series revealed that skin flaps and skin grafting are the two main surgical procedures performed in routine practice in the plastic surgery department of the Aristide Le Dantec Hospital.

Moujahid [44] in his study found that in 70% of cases, combined flaps and grafting were indicated for the primary management of burns of the hand. Costagliola [15] also describes the use of skin flaps and grafting as the first therapeutic option for the management of burns sequelae.

A literature review reveals that young children constitute a group at high risk of burns in the Sub-Saharan African countries. And because of the inadequacy of the technical resources, inappropriate treatment would lead to sequelae for which treatment would be more costly, requiring recourse to interventions specific to plastic surgery [61].

The Swiss Society of Plastic Surgery classifies the most common reconstructive surgery procedures into 4 groups, with surgery for congenital malformations (congenital malformations of the hand and foot, facial clefts and craniosyndromes) in the first line, followed by reconstructive burn surgery, then surgical oncology and reconstruction after tumor removal, and finally other surgeries (surgery for pressure sores, ulcers, post-traumatic reconstruction, etc.). For these conditions, the types of surgery performed are, in chronological order: skin flaps and grafts, flaps and tissue expansion [81]. These procedures can be combined, sequential, in several steps or according to a decision algorithm.

The treatment of keloids and hypertrophic lesions in our study was based on a decision tree as described by Yonga [79].

Skin expansion was not employed in our study. The high cost of the material, which was not available in our region, explains why this technique was not used. Although performed by some teams, it remains a delicate procedure in children, both in terms of monitoring and in the management of related complications [25, 41, 53].

Other techniques are also highlighted, common to several surgical specialties, illustrating the diversity of techniques and the interconnection of specialties in the management of children in pediatric plastic surgery [41, 47, 72].

EVOLUTION

We found complications related to treatment in our study in 7.75% of patients.

Complications common to all surgeries [14, 22, 56] were not taken into account. We only analyzed cases of recurrence or unsatisfactory outcome related to the treatment.

We reported cases of palatal fistulas after staphylorrhaphy, as described by Bénateau [8].

Thirteen cases of recurrence of contracture scars of the hand were observed in our study, as well as three (3) cases of tendon contracture after treatment of post-burn contracture, as described in the studies of Moujahid [45] and Oosterwijk [51]. The skin-bleaching found in our study is also described by Dutel-Charneux [27].

CONCLUSION

Pediatric plastic surgery is a complex specialty at the crossroads of several fields. It requires good theoretical and technical knowledge, so that the practitioner has the best skills in the exercise of this art which is constructed around a building in constant modification: "the child". In French-speaking Sub-Saharan Africa, it is still little known and little practiced because of the small number of plastic surgeons. So how to make this specialty known to the general public, if nobody gives them the information?

We wanted to answer this question with our work, by highlighting the main therapeutic approaches of this specialty in Dakar within the pediatric population.

Our study is a retrospective and analytical study over a period of 5 years, from January 1, 2014 to December 31, 2018 counting all children aged 0- 15 years who consulted at the Plastic and Reconstructive Surgery Department of the HALD.

We obtained the following results:

Eight hundred and twenty-four (824) children were seen during the study period, representing 43.97% of the total activity of the department. The mean age of our patients was 5.02 years, the age range from 29 days to 30 months represented 42.72%. The sex ratio was 0.8. The patient referrals amounted to 34.95%, mainly from the Pediatric Surgery departments of the HALD and the Albert Royer Hospital. The chief complaint was aesthetic discomfort in 315 cases. The most common condition was post-burn retraction in 220 cases, followed by facial clefts and craniofacial malformations in 140 cases. Seven hundred and thirty-five (735, 89.2%) patients underwent treatment, of which skin flaps and grafts were the most performed, respectively in 362 and 221 cases. Physical therapy was associated with surgery in 108 cases.

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Author Information

M.L. FOBA
Plastic and Reconstructive Surgery Department Aristide Le Dantec teaching hospital
Dakar, Senegal

Ai. Ndiaye
Plastic and Reconstructive Surgery Department Aristide Le Dantec teaching hospital
Dakar, Senegal

M.S. Ndiaye
Plastic and Reconstructive Surgery Department Aristide Le Dantec teaching hospital
Dakar, Senegal

L. Ndiaye
Plastic and Reconstructive Surgery Department Aristide Le Dantec teaching hospital
Dakar, Senegal

A.A. Sankale
Plastic and Reconstructive Surgery Department Aristide Le Dantec teaching hospital
Dakar, Senegal