

A Retrospective Review of the Treatment of Radial Club Hands at Two Tertiary Centres in Côte d'Ivoire

K T-H Odéhour^{*}, J-C Gouli^{**}, O Ouattara⁺, A Monsia⁺⁺,
RK Dick^{+*}

Summary

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Background: The treatment of radial club hands is difficult and requires staged procedures in specialised centres.

Objective: To report the Ivorian experience with this condition.

Settings: Yopougon Teaching Hospital, Abidjan and "Don Orione" Centre for the Crippled, Bonoua.

Subjects and Methods: The management of 22 club hands in a cohort of 14 patients (nine boys and five girls) aged 14 days - 12 years (mean age, 3.3 years \pm 4.3) over a 14-year period, was reviewed. Three of the children were neonates, six were aged one month-one year while the rest were older than one year. The lesions were classified according to the method described by Bayne & Klug. They were all treated surgically with preoperative physical care in the neonates and infants. Functional and aesthetic results were assessed by using the criteria of Cattaneo *et al* at a mean follow up period of 2.4 years.

Results: Twelve of the children had Bayne type IV deformity, nine type I and one type II. Eleven children with type IV deformity were treated by centralization with ulnar osteotomy and one child with type IV, by centralization alone. Complications included one case of wound infection, two with haematomas and two pin migrations without recurrence of wrist deviation. According to Cattaneo *et al*'s staging score, the hand function was good in 18 cases and average in four; aesthetic result was good in 12 hands, average in six and poor in four.

Conclusion: The treatment provided satisfactory results for the children and their families with the result that there has since been an increase in the number of club hands referred to the hospital.

Key words: Congenital radial club hand, treatment, children

CHU de Yopougon, Abidjan - Côte d'Ivoire

Service de Chirurgien Pédiatrique

^{*} Chef de clinique-Assistant, Chirurgien des Hôpitaux

^{**} Professeur Agrégé, Chirurgien des Hôpitaux

^{+*} Professeur Agrégé, Chirurgien des Hôpitaux, Chef de service

Centre Don Orione pour handicapés physiques de Bonoua, Côte d'Ivoire

⁺⁺ Chirurgien - Chef, Chirurgien des Hôpitaux

Correspondence: Docteur Thierry-hervé Koudou Odéhour^{*} Email: odéhour^{*}@voilà.fr

Introduction

RADIAL club hand is a congenital disease whose clinical patterns vary according to the degree of the radial defect. Typically, the hand has four fingers and deviates laterally beyond 90 degrees. Clinical presentations have been classified into four grades of severity by Bayne & Klug.¹ Treatment is based on physical care combined with staged surgical corrections. The first is reduction of the wrist and centralization of the hand and the second, ulnar lengthening followed by late thumb reconstruction in case of need. Cattaneo *et al*² have recently proposed a staging score for assessing functional and aesthetic results. We report our experience in the management of this condition.

Patients and Methods

From November 1990 to June 2004, 22 club hands in nine boys and five girls aged 14 days–12 years (mean, 3.3 years \pm 4.3) were treated at the paediatric surgery unit of Yopougon teaching hospital in Abidjan and “Don Orione” center for the crippled at Bonoua, Côte d’Ivoire. Their hospital charts were retrospectively reviewed for demographics and clinical data that included clinical presentations, x-ray findings, treatment undertaken and outcome. The club hands were classified according to the scheme proposed by Bayne & Klug¹ (Table I). All the patients underwent surgery following preoperative physical care including manipulations and serial plasters in children \leq 2 years, while five children who were older than two years, underwent surgery directly. Neither forearm lengthening nor thumb reconstruction was done. All the patients were immobilized after surgery by using plasters for neonates and thermoplastic splints for the older ones. They were followed clinically and radiographically once a month for the first three months, once in three months during the following six months, and every six months thereafter, with an average follow up period of 2.4 years. Functional and aesthetic assessments were based on Cattaneo *et al.*'s staging score in four stages for each (Table II).

Results

A summary of the clinical data is shown in Table I. Bayne type IV predominated, accounting for 12 (54.5 percent) of the 22 lesions. Analysis based on age showed the following: there were four type IV lesions in three neonates, two type IV and six type I lesions in five infants and six type IV, three type I, and one type II lesions in six older children. In the younger age group, the Bayne type IV patients who received physical care required wrist reduction by ulnar osteotomy before centralization; the other three patients with six Bayne type I lesions required only soft tissue release to relieve a residual wrist contracture (Table I). The mean surgery time in neonates and infants was 2.4 years versus seven years for the older children. Complications encountered included two cases of haematoma, and one case of wound infection; they were secondarily excised. Others were two cases of pin migrations which required removal and replacement while two constrictive scars were released by z-plasties. Solid union and wound healing were achieved in all patients. No wrist deviation has recurred. According to result categories advocated by Cattaneo *et al.*,² the hand function was good in 18 cases and average in four; the aesthetic result was good in 12 hands, average in six and poor in four (Table II).

Table I

Summary of the Cases

Case No.	Age	Sex	Side	Clinical Findings		Type*	Procedures	Complication
				Forearm	Thumb			
1	4 days	M	B	S-D	Floating	IV	R-C-O	Pin migration
2	20 days	M	Right	S	-	IV	R-C	-
3	1 month	M	Right	S-D	Floating	IV	R-C-O	Pin migration
4	12 years	F	Right	-	-	I	R-O	-
5	9 months	F	Right	D	-	IV	C-O	Infection
6	11 months	M	B	-	-	I	R	-
7	1 year	M	B	-	-	I	R	-
8	8 years	F	B	-	-	IV	R-C-O	Haematoma
9	9 years	M	Right	D	-	II	R-O	CS
10	19 months	F	B	-	-	I	R	Haematoma
11	1 year	M	B	-	-	I	R	-
12	8 years	F	B	D	-	IV	R-C-O	CS
13	3 years	M	B	D	-	IV	R-C-O	-
14	15 days	M	Right	S-D	Floating	IV	R-C-O	-

M: male; F: female; B: bilateral; R: soft tissue release; C: centralization; O: osteotomy; S: short; D: deviated; CS: constrictive scars.

* Bayne & Klug's classification: Type I: distal radius hypoplasia; Type II: radius hypoplasia; Type III: partial radius aplasia; Type IV: complete radius aplasia

Table II

Functional and Aesthetic Results*

Outcome	Excellent	Good	Fair	Poor
Functional	-	18 (81.8%)	4 (18.2%)	-
Aesthetic	-	12 (54.5%)	6 (27.3%)	4 (18.2%)

* According to the criteria advocated by Cattaneo et al.²

(1) Functional results

Excellent: Fingers and elbow functions are satisfactory for patient and physician**Good:** Fingers and elbow functions are satisfactory only for the patient**Average:** Fingers and elbow functions are slightly improved**Poor:** Fingers and elbow functions have decreased as compared to previous status.

(2) Aesthetic results

Excellent: Centred hand with very important lengthening**Good:** Centred hand with mild lengthening**Average:** Flexed elbow with anterior constrictive scar**Poor:** Aggravation with loss of centralization

Fig. 1: Bayne type IV bilateral congenital radial club hands in a young girl who was referred late to the hospital.

Discussion

Early physical care, preferably at birth and if not, before two years of age is nowadays recognized as an essential prior condition for successful surgery.³ Such ideal timing could not be planned in five patients with late referral due to economic and cultural reasons. For those in whom this therapy was carried out, we believe it was effective namely in Bayne type IV lesions since the wrist mobility had significantly improved before surgery (Fig 1). In Bayne type I patients, it was more difficult to establish a clear benefit of this care as the deformities were less stiff. However, we can deduce that it was also useful in these patients since the wrist reduction was achieved without ulnar

osteotomy or centralization but only by soft tissue release. Moreover, prior physical therapy made the surgical procedure much more effective as compared with those without any prior preparation. Postoperatively, the affected parts were immobilized



Fig. 2: An AVX-ray view showing centralization and stabilization of the wrist with a Kirschner wire.

in all the patients in order to maintain the reduced position, as is usually recommended.³

So far, the centralization procedure described by Sayre⁴ in 1893 is the most frequently used. It allows for the realignment of the wrist on the forearm in 12 Bayne type IV cases (Fig 2). For most workers, the optimal surgery time is during the first two years of life due to the excellent adaptation of corrected structures to their altered function.³ We have followed this practice for all but five patients who were recently referred to the hospital. In 11 of 12 Bayne type IV, ulnar osteotomy was effective in correcting deviated forearms.⁵ We have also used it to increase the aesthetic

aspect for two mild Bayne types (I and II). As carpal excision due to centralization is still debatable, several approaches have recently been proposed for the preservation of the forearm's growth potential.^{6,7} Other workers have developed new slow distraction techniques by external fixation prior to centralization.^{8,9} None of these techniques was attempted in our series as they are still in their evolutionary stages. Due to the lack of both technical resources and microsurgical expertise, lengthening and thumb reconstructive stages could not be carried out.^{2,3,10}

Immediate complications encountered in this series were not specific to this type of surgery. In contrast, pin migration and constrictive scars seen in four patients exemplify the problem of repeated surgery until fully grown. Cattaneo *et al*² reported the results of their own treatment in 14 club hands with a staging score trial. With regard to the functional aspect, Cattaneo *et al*² reported average results in 71.4 percent of their patients compared to 81.8 percent of good results in ours, and one poor result in contrast to four in three of our patients with floating thumbs. These results might not be strictly comparable as their patients' mean age of 14.8 years was higher than ours and none of ours was reconstructed. From the aesthetic point of view, their results were excellent or



Fig. 3: The same patient after surgery; the radial deviation has been partially corrected but the forearm remained short.

good in 85.7 percent versus 54.5 percent in ours. This variation results from the difference in treatment methods. They used an Ilizarov circular fixator to lengthen the forearm after centralization followed by wrist joint arthrodesis; none of the forearms in our series was lengthened and the forearm remained short in three patients with four club hands (Fig 3). Non-recurrence of deformity occurred in both series. This was attributed to the arthrodesis of wrist joint in theirs, but rather to the shortness of follow up in ours. Indeed, their follow up as also reported by Damore¹¹

averaged 6.5 years versus 2.4 years in ours. There is however, no doubt that forearm lengthening and thumb reconstruction would have improved both functional and cosmetic results of our patients.^{2,10} Due to the lack of these two stages, the results appear less than optimum according to the criteria of Cattaneo, *et al*² but not for families who were pleased with the global outcome, and as indicated by the increasing referral of cases to our hospital.

In conclusion, we are of the opinion that congenital radial club hand is a difficult condition to treat as it requires special expertise for diagnosis and care. There is a need to become more familiar with forearm lengthening and thumb plastic procedures in order to optimize the final result in children with radial club hands.

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