Penning Fixator in Severe congenital Finger Contractures

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Introduction

Congenital contractures of fingers are rare and Camptodactyly ,Arthrogryposis, congenital Volksmans ischemic contracture ,Trismus pseudo camptodactyly syndrome and localized scleroderma are the notable causes .Among these causes ,Camptodactyly is more common and main stay of the treatment is conservative management. But ,In severe cases ,a two stage reconstruction with Penning fixator to lengthen the contracted tissues on the volar side and subsequently extensor augmentation with FDS is performed.

Penning External micro fixator useful for both axial and rotational deformties of fingers both congenital and acquired.

Camptodactyly is a congenital but most common ,often progressive contracture of proximal inter phalangeal joint affecting the ring and little finger.

After the first case report from Tramlin et al.(1846)there has been much debate regarding the etiology and treatment.1

True incidence of camptodactyly is estimated to be less than 1%of population.2

Material & Methods

A case series of 89patients (M:F – 5:4) between 04-16 years old were operated for severe camptodactyly with average contracture of 76 degrees, between 2008 and 2018 were included in our study.

- ❖A though-rough history and examination set the baseline measures.
- ❖All patients underwent a trial of conservative treatments.
- ❖The management composed of a two stages procedure utilising the PEF.
- ❖Firstly, the application of PEF to PIPJ.
- ❖All patients had one turn daily distraction of PIPJ.
- ❖All patients had regular follow up twice monthly.
- ❖After adequate straightening of finger, FDS transfer to central slip and lateral band of extensors apparatus was performed after 4-6 weeks time.
- ❖Intensive hand physiotherapy was continued to prevent recurrence.

Aims and objectives

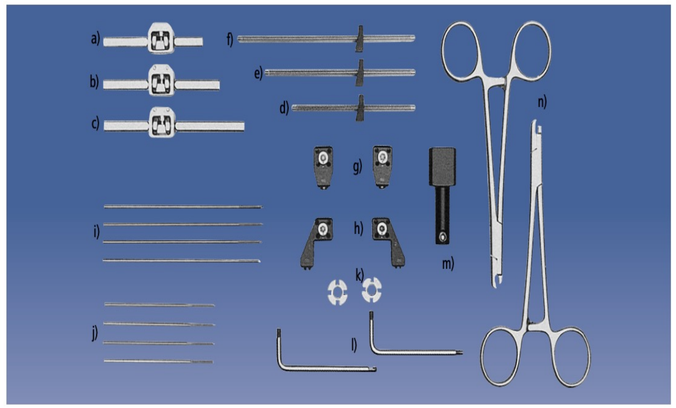
To study the role of Penning external fixator(PEF) in the management of congenital finger contractures(Camptodactly, Distal arthrogryposis,Psydocamptodactyly syndrome,Volksmans ischemic contracture).

Bensun et al. Classification[3]

Type 1 - Classical, present in infancy, typically confined to one or both little fingers but other fingers may also be involved.

Type 2 - Present in adolescents.

Type 3 - Severe form, involving multiple digits.

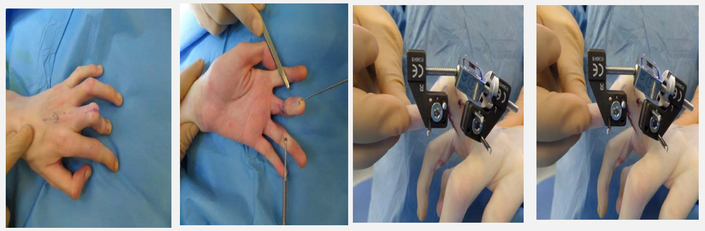


Orthofix Equipment

The equipment available includes the following items, not all of which will be needed on every occasion:

a) Short PMF body (M402)
b) Standard PMF body (M403)
c) Long PMF body (M404)
d) Short lengthening bar complete with spacer (M415)
e) Standard lengthening bar complete with spacer (M416)
f) Long lengthening bar complete with spacer (M417)
g) Standard clamps (M411, pack of 2)
h) L-clamps (M410, left and right)
i) 2.0mm threaded wires (M426, pack of 4)
j) 1.6mm threaded wires (M420, pack of 4)
k) Compression-distraction nuts (M412)
l) Two 3.0mm Allen Wrenches (10012)
m) Threaded wire extractor (M442)
n) Reduction forceps (M441, set of 2)

One Allen Wrench and the wire extractor are included for outpatient removal of the Minifixator.



Sn	Sex	Fingers	Age	F/H	P	Pre Op	Findings	PEF	Procedure	Post Op	FU91 year)	OC	Ps
1	M	LLF	12	Y	PEF&FDS	60	FDS/ED	Y	2 stage	18	I	G	H
2	F	RLF	16	N	PEF&FDS	48	FDS/ED	Y	2 stage	26	I	G	H
3	F	LLF	13	N	PEF/FTSG	64	FDS/ED/LUM	Y	2 stage	12	I	G	H
4	F	LLF	10	Y	PEF/FDS	48	FDS/ED	Y	2 stage	20	I	G	H
5	M	R>L	15	N	PEF/FDS	48	FDS/ST	Y	2 stage	10	I	G	H
6	M	LMF,LRF	8	N	PEF	75	FDS	Y	2 stage	20	I	G	H
7	M	Bil LF	13	N	PEF	75	FDS	Y	2 stage	20	I	G	H
8	F	LLF	14	N	PEF	80	VP,FDS	Y	2 stage	40	I	Sat	H
9	M	LLF	11	Y	PER/FDS/K WIRE.	48	TIGHT FDS	Y	2 stage	15	I	G	H

Camptodactyly is difficult to treat and maintain good functional results.

Conservative management with splint and passive stretching can potentially improve the amount of PIPJ contracture [3,5,8,9].Pre-requires compliant patient and supervised therapy in a well motivated patient with a mild deformity.

Multiple techniques have been described. Smith and Kaplan[3] performed an isolated tenotomy of the FDS at the wrist or the hand in 12 fingers with camptodactyly. Flexion deformity decreased by at least 33% in all fingers.

Jones et al.[4] reported a small cohort of six patients who underwent flexor digitorum superficialis transfer to digital extensors apparatus. The residual PIPJ contracture averaged 15 (0-25) degrees.

Smith at al.[18] reported 16 patients who were classified according to Siegart et al.[5] after average 2,8 years follow up, considering parameters of extension and flexion. Excellent or good results were reported in 15 fingers or 83%(65 excellent and 9 good). Two fingers were rated as fair and one poor.

Distraction of joints soft tissues with application of ex-fix was first done by Kalonaii and Miloslavskii (1987).[6]

References

1. Smith RJ, Kaplan EB. Camptodactyly and similar atraumatic flexion deformities of the proximal interphalangeal joints of the fingers: A study of 31 cases. J Bone & Joint Surg Am 1968:50(6):1187-203.
2. ensun LS,Waters PM, Kamil N I et al.Camptodactly classification and results of none operative treatment. J Pediat Orthop 1994:14(6):814-9.
3. Jones KG, Marmor L, Lankford LL. An overview on new procedures in Surgery of the hand .Clin Orthop Relat Res 1974:99:154-67.
4. Jones KG,Marmor L, Lankford LL.An overview of a new procedures in the surgery of hand.Clin Orthop 1974 ;99:154-167.
5. Siegert JJ,Cooney WP, Dobyns JH .Management of simple Camptodactly.J Hand Surg 1990:15:181-189.
6. Kolonati I, and Kilpslavskii FA.;Distraction tenoplasty in injuries of the flexor tendons of the fingers at the level of the ostofibrous synovial canal..Ortop.Traumatol.Protez,Vol48,P.1-3,1987
7. Natividade P.D.S,Barbosa R.,Ferreira P,.Ferreira A,.Reis J. and Ammarante J,:Correction of long term joint contractures of the hand by distraction.A case report.Br. J .Plastic and Reconst.Surg.,Vol 58,P.1148-1151, 2005.
8. Hori M, Nakura R, Inoue G,et al.None operative treatment of camptodactly.J Hand Surg 1987;12:1061-1065
9. Miura T, Nakamura R,Tamua Y.Longstanding extended dynamic splintage and release of an abnormal restraining structure in camptodactly.J Hand Surg 1992;17:665-672.