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Evaluation of Clinical Outcomes of Arm Sling versus Figure of _8‘ Bandage for Pediatric Clavicle Fractures

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Abstract: ***Background: Paediatric clavicle fracture is a very common injury presented to an orthopaedist all over the world. Previously most of the paediatric clavicle fractures have been managed conservatively. Recently there is a surge of surgical management for these injuries as recommended in literature. Materials and Methods: We have conducted a prospective clinical study to compare two modes of conservative management for paediatric clavicle fractures in children aged 4 years to 11 years over a period of 6 months after excluding indications for surgical management as per literature. Total of 75 patients included in the study after consideration of inclusion and exclusion criteria. Group 1 consisting of 38 patients managed with figure of "8" bandage and group 2 consisting of 37 patients managed with simple arm sling. Mean radiographic and clinical follow up was of 6 months. Results: Both the groups showed excellent and comparable clinical as well as radiological results at last follow up. But group 2 showed better results in terms of complications, number of days required to get back to his/her routine activities after injury and financial burden to the parents of patient. Conclusion: We recommend that simple arm sling is a better mode of management for paediatric clavicle fractures which can be managed conservatively.***

Keywords: clavicle; fracture; arm sling; figure of –8” bandage; paediatric.

1. Introduction

Clavicle fractures are very common injuries in paediatric population presented to an Orthopaedic OPD after distal arm and forearm injuries. Approximately 8-15 % of all paediatric fractures are clavicle fractures [1-3]. Previously, most of the clavicle fractures were managed conservatively with good follow up results as reported in literature [4,5]. But recently since few years operative management of paediatric clavicle fractures becomes in limelight as per literature for some peculiar indications [6-8]. Indications for surgical management of paediatric clavicle fractures reported in literature includes open injury, concomitant neurovascular injury, severely displaced fractures with skin breach [9-13]. After review of literature, we found that very few studies [4, 14] are available comparing two modes of conservative treatments for paediatric clavical fractures which prompts us to conduct this study after excluding all indications for surgical management of pediatric clavicle fractures as mentioned above.

2. Material and Methods

In this study, randomly allocated 75 patients of either sex aged between 4 years to 11 years who underwent either figure of –8” bandage (n = 38) or simple arm sling (n = 37) for the treatment of paediatric clavicle fractures between June 2014 and December 2014 in the department of Orthopaedics, ESI-PGIMSR, model hospital, Basaidarapur, New Delhi were enrolled after radiographic verification of the fracture and obtaining the informed consent. The patients were selected after consideration of all inclusion criteria and exclusion criteria as mentioned below. For both the groups, simple 4” inch cotton bandage were utilized in two different manners ie, arm sling and figure of –8” bandage, for the management of paediatric clavicle fractures.

Inclusion Criteria
1. Age from 4 years to 11 years.
2. Paediatric clavicle fractures.
3. Minimally displaced fractures < 2 cms.

Exclusion Criteria
1. Open fractures
2. Fracture with neurovascular disruption
3. Fracture associated with brachial plexus injury
4. Markedly displaced fracture > 2 cms.
5. Fracture associated with loss of skin integrity.
6. Floating shoulder injury

- Group 1 (figure of –8” bandage) - This group consists of randomly allocated patients presented to orthopaedics OPD with diagnosis of clavicle fracture. This group managed with application of 4” inch cotton bandage in figure of –8” fashion after putting a layer of cotton roll in the same fashion.
- Group 2 (simple arm sling) - This group consists of randomly allocated patients presented to orthopaedics OPD with diagnosis of clavicle fracture. This group managed with application of 4” inch cotton bandage as simple arm sling with soft collar around neck.

Patients in both the groups kept in bandage until they become comfortable and pain free. All the patients were encouraged to start doing shoulder exercises as soon as they feel like able to do it.

- Radiological assessment- Plain Antero-posterior radiographs of chest with bilateral clavicle were obtained after trauma and at 3 weeks, 6 weeks, 3 months, 6 months

and 1 year after application of either arm sling or figure of –8" bandage.

- Clinical assessment- All the patients enrolled in the study underwent clinical evaluation in terms of active and passive range of motion, cosmetic appearance and any complications at 1 week, 3 weeks, 6 weeks, 3 months, 6 months and 1 year after application of either arm sling or figure of –8" bandage.
- Duration of bandaging, number of days required to get back to routine activities after injury and number of OPD visits were recorded for all the patients in both groups.

3. Results

Age, sex and side distribution were similar in both the groups. Type of fracture classified as per Robinson classification [table1] for all the patients and found to have no statistical difference between the two groups.

The median duration of bandaging in figure of –8" bandage group and arm sling group were 27 days and 16 days respectively [table 2].

The median number of OPD visits to the orthopaedists was six for the figure of –8" group and one for the simple sling group apart from predefined number of follow up visits.

This finding is mainly caused by diversity in the discomfort caused by the bandage, impairment of personal care, sleep disturbances (as told by parents) and loosening of bandage in figure of –8" bandage group.

Fifteen patients in figure of –8" bandage group and four patients in arm sling group developed skin rashes around axilla and around neck respectively due to bandage. This complication was managed effectively by dermatologist in both the groups with good results.

Three patients in the figure of –8" group and three in the arm sling group reported about a lump over fracture site at last follow up, but their parents did not find this cosmetically disturbing.

All fractures in both groups were healed radiographically at last follow- up examination. The alignment of the healed fractures remained largely unchanged from the initial displacement in both groups.

Both the groups were similar in terms of type of fracture. Clinical and radiological results were similar in both the groups. But Arm sling group showed better results in terms of duration of bandaging, number of OPD visits, number of days required to get back to routine activities after injury, complications such as rashes around axilla and neck compared to figure of –8" bandage group.

4. Discussion

Clavicle fractures are very common injuries in paediatric population after distal arm and forearm injuries. Previously, most of the paediatric clavicle fractures were managed conservatively using multiple methods available [15-17] in view of good healing rates and low incidence of complications. Recently there is a surge of utilizing surgical management for these injuries in the acute setting when associated with open injury, severely displaced fractures with skin breach, concomitant neuro-vascular injury [6– 10]. Despite of being so common injury in paediatric population, very few studies available in literature on clavicle fracture mainly focussing on paediatric population.

In our study, we have excluded all the clavicle fractures associated with risk factors which should be managed surgically according to literature. We have excluded such cases to get results more genuine and to avoid confounding factors which can affect the results. In childhood, periosteal sleeve is thicker and the bone is softer and pliable than in adults [18]. According to literature, the larger percentage of displaced clavicle fractures being encountered with increasing age [19]. This finding is in favour of utilizing conservative modes of treatment for such injuries and this prompts us to conduct a study to know the better mode of conservative treatment.

Some authors have recommended that paediatric patients with clavicle fractures require no follow-up at all [20]. Healing of paediatric clavicle fractures is known to occur within four to six weeks [21]. But we kept our radiographic follow-up of one year to make it a better prospective clinical study and all the patients were radiographically healed at the last follow up.

As per literature, clavicle injuries in paediatric population, whether minimally displaced or undisplaced, heal clinically, in view of absence of pain and return of full function. This is usually achieved at a mean duration of six weeks for all paediatric clavicle fractures [19]. We found the same results in our study too after six weeks of follow up with total of one year follow up.

Mal-union is almost invariably consistent with a functionally and cosmetically satisfactory result [16,17,22,23]**.** In our study, we found the same finding in six of our patients in both the groups.

In review of literature, we found very few studies comparing two conservative modes of treatment (simple arm sling and figure of –8" bandage) for clavicle fractures [4,14]. Out of them, very few studies available which compared the same in paediatric population [14]. This is the reason why we have undertaken this clinical study.

There is no study available comparing the two modes of conservative treatment for paediatric clavicle fractures in last twenty years but few studies available prior to that comparing the same not exclusively in paediatric population. Previous studies showed better results with arm sling group as seen in our study too.

In our study both groups showed good & comparable clinical and radiological results but arm sling group showed better results in terms of duration of bandaging, number of OPD visits, number of days required to get back to his/her routine activities after injury, complications such as skin rash compared to figure of —8 bandage group which poses

more expenditure of time and money to the parents of the patients in figure of –8" bandage group.

There are few limitations in our study which includes short follow up and small study group. We recommend a study to be carried out with a long follow up and large sample size to verify and validate our results in future.

5. Conclusion

The clinical, radiological, functional and cosmetic results of both the conservative methods of treatment for clavicle fractures in patients aged 4 years to 11 years are identical, but the simple arm sling group patients provides more comfortable course of treatment, fewer number of OPD visits and few complications compared to figure of –8" bandage group of patients. In conclusion, for management of paediatric clavicle fractures after excluding surgical cases, simple arm sling provides a safe and excellent alternative to treatment with a figure of –8" bandage.
Compliance with ethical standards:

6. Funding

Not Applicable.

7. Conflict of Interest

All authors declare that they have no conflict of interest.

8. Ethical Approval

All procedures performed in our case report involving human participant were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

9. Informed Consent

Informed consent was obtained from the patient and their parents included in our study. All the Patients and their parents have given consent for the Clinical study to be published.

References

[1] L. A. Landin, –Fracture patterns in children. analysis of 8,682 fractures with special reference to incidence, etiology and secular changes in Swedish urban population," *Acta Orthopaedica Scandinavica*, 1983; vol. 54, supplement 202: pp. 1– 109.
[2] R. P. Lichtenberg, —A study of 2,532 fractures in children," *The American Journal of Surgery*, 1954; vol. 87, no. 3: pp. 330–338.
[3] A. Nordqvist and C. Petersson, –The incidence of fractures of the clavicle," *Clinical Orthopaedics and Related Research*,1994; no. 300: pp. 127–132.
[4] K. Andersen, P. Ostergaard Jensen, and J. Lauritzen, –Treatment of clavicular fractures: figure-of-eight bandage versus a simple sling," *Acta Orthopaedica Scandinavica*,1987; vol. 58, no. 1: pp. 71–74.
[5] D. Stanley and S. H. Norris, –Recovery following fractures of the clavicle treated conservatively," *Injury*,1988; vol. 19, no. 3: pp. 162–164.
[6] V. Smekal, A. Irenberger, R. E. Attal, J. Oberladstaetter, D. Krappinger, and F. Kralinger, –Elastic stable intramedullary nailing is best for mid-shaft clavicular fractures without comminution: results in 60 patients," *Injury*,2010; vol. 41: pp. 713– 718.
[7] S. Thyagarajan, M. Day, C. Dent, R. Williams, and R. Evans, –Treatment of mid-shaft clavicle fractures: a comparative study," *International Journal of Shoulder Surgery*,2009; vol. 3: pp. 23– 27.
[8] J.M.Hill,M. H.McGuire, and L. A. Crosby, —Closed treatment of displaced middle-third fractures of the clavicle gives poor results," *Journal of Bone and Joint Surgery B*,1997; vol. 79, no. 4: pp. 537–539, 1997.
[9] F. M. Howard and S. J. Shafer, –Injuries to the clavicle with neurovascular complications. A study of fourteen cases," *Journal of Bone and Joint Surgery A*,1965; vol. 47, no. 7: pp. 1335– 1346.
[10] M. Jablon, A. Sutker, and M. Post, –Irreducible fracture of the middle third of the clavicle. Report of a case," *Journal of Bone and Joint Surgery A*,1979; vol. 61, no. 2: pp. 296–298.
[11] A. B. Mullaji, —Low-contact dynamic compression plating of the clavicle," *Injury*,1994; vol. 25, no. 1: pp. 41–45.
[12] J. Poigenfurst, G. Rappold, and W. Fischer, –Plating of fresh clavicular fractures: results of 122 operations," *Injury*,1992; vol. 23, no. 4: pp. 237–241.
[13] E. J. Zenni, J. K. Krieg, and M. J. Rosen, –Open reduction and internal fixation of clavicular fractures," *Journal of Bone and Joint Surgery A*,1981; vol. 63, no. 1: pp. 147–151.
[14] McCandless DN, Mowbray MA. Treatment of displaced fractures of the clavicle. Sling versus figure-of-eight bandage. Practitioner. 1979 Aug; 223(1334):266-7.
[15] Lester, C. W. The treatment of fractures of the clavicle. Ann Surg. 1929 ; 89: 600-606.
[16] Quigley, T. B. The management of simple fractures of the clavicle. New Engl. J. Med. 1950; 243: 286-290.
[17] Neer, C. S. I1 (1975) In: Rockwood, C. A. & Green, D. P. (Eds.) Fractures pp. 611-617. J. P. Lippincott Company, Philadelphia, Toronto.
[18] P. H. Randsborg and E. A. Sivertsen, –Distal radius fractures in children: substantial difference in stability between buckle and greenstick fractures," *Acta Orthopaedica*,2009; vol. 80, no. 5: pp. 585–590.
[19] Barry J. O'Neill, Alan P.Molloy, andWilliam Curtin. ConservativeManagement of Paediatric Clavicle Fractures. International Journal of Pediatrics Volume 2011, Article ID 172571, 4 pages
[20] J. D. F. Calder, M. Solan, S. Gidwani, S. Allen, and D. M. Ricketts, –Management of paediatric clavicle fractures—Is follow-up necessary? An audit of 346 cases," Annals of the Royal College of Surgeons of England,2002; vol. 84, no. 5: pp. 331 333.
[21] M. Pecci and J. B. Kreher, –Clavicle fractures," American Family Physician,2008; vol. 77, no. 1: pp. 65–71.
[22] Sisk, D. A. (1980) In: Edmonson, A. S. & Crenshaw, A. H. (Eds.) Cambell's operative orthopaedics. 6th ed. pp.

659-662. The C. V. Mosby Co., St. Louis, Toronto, London.
[23] Effenberger, T. Claviculafrakturen:Behandlung,Nachuntersuchungsergebnisse Chirurg. 1981; 52: 121-124.

Table 1: Robinson's Classification of Clavicle Fractures

Type 1A1: medial 1/5th, undisplaced, extra-articular
Type 1A2: medial 1/5th, undisplaced, intra-articular
Type 1B1: medial 1/5th, displaced, extra-articular
Type 1B2: medial 1/5th, displaced, intra-articular
Type 2A1: middle 3/5ths, undisplaced
Type 2A2: middle 3/5ths, angulated
Type 2B1: middle 3/5ths, Simple or wedge comminuted
Type 2B2: middle 3/5ths, isolated or comminuted segmental
Type 3A1: lateral 1/5th, undisplaced, extra-articular
Type 3A2: lateral 1/5th, undisplaced, intra-articular
Type 3B1: lateral 1/5th, displaced, extra-articular
Type 3B2: lateral 1/5th, displaced, intra-articular

Table 2: Results

Evaluation factor		Group1	Group2
		Figure of ~~–8~~" bandage	Arm sling
Age	Mean age	7 years	7.6 years
Sex	Male	30	28
	Female	8	9
Side	Right	20	19
	Left	18	18
Type of fracture (as per Robinson classification)	Type 1	1	0
	Type 2	35	36
	Type 3	2	1
Duration of bandaging		27 days	16 days
No. of days required to get back to his/her routine activities after injury		42 days (6 weeks)	28 days (4 weeks)
Number of OPD visits	Apart from predefined visits	6	1
Radiographic healing		5 weeks	5 weeks
Complications	Skin rash	15 (around axilla)	4 (around neck)
	Visible lump over fracture site	Three	Three