Short Report:
Modified Thomas Splint for the Non-operative Management of Pediatric Femoral Shaft Fractures.

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Abstract: Pediatric femoral fractures constitutes less than 2% of all fractures in children and management of these fractures either by conservative or operative methods are determined by many variables. Initial traction followed by delayed hip spica application is one of the non-operative treatment option for femoral shaft fractures in children below 6 years of age. Selection of an appropriate size Thomas splint to provide an effective initial traction plays a vital role in this treatment aspect. But there is paucity of commercially available Thomas splints of appropriate size for pediatric population. As a solution to address these problems, we share our experience of modified Thomas splints which are made using some of the easily available and reusable parts of Ilizarov apparatus.

Key Words: Pediatric femoral fractures, Non operative, Modified Thomas splint, Ilizarov parts

Introduction:
Pedicet femoral fractures constitutes less than 2% of all fractures in children, often requiring prolonged immobilisation or surgery.[1] Management of these fractures either by conservative or operative methods are determined by variables like age, weight of the patient, type of fracture and associated injuries/ polytrauma.[2] Fractures in children below 6 years of age are usually managed non-operatively due to excellent remodelling potential.[3] Initial traction followed by delayed hip spica application is one of the non-operative treatment option for femoral shaft fractures in this age group.[3] Selection of an appropriate size Thomas splint to provide an effective initial traction plays a vital role in this treatment aspect. It not only ensures safety and simplicity in the management but also better cooperation from children during the consolidation phase of the fracture. There is a paucity of commercially available Thomas splints of appropriate size for pediatric population. Even if they are available, it will be a huge burden in terms of maintaining the inventory. To address some of the above mentioned issues, we the authors are describing and sharing our experience of modified Thomas splints which are made using some of the easily available and reusable parts of Ilizarov apparatus.

Materials and Method
The proposed modified Thomas splint is in use in our department for the past one year, keeping in mind the exact size that is required in a given patient. The size of the ring is determined by measuring the circumference of the thigh at the groin. The length of the inner iron bar is likewise measured from the groin to the sole of the unaffected limb, with an addition of 6-inches to allow proper traction. Depending on the size required, a pair of appropriate sized half rings from the Ilizarov set is obtained to make a full ring. Similarly, the required length of the inner and outer bars will dictate the selection of reusable treaderd rods from the Ilizarov set. Often two (or rarely three) long threaded rods will have to be joined to each other using one or two bushings to create the inner and outer bars. Depending on the angle required the slightly longer outer rod could be fixed to the ring using male or female hinges. Distally the lower ends of the threaded rods are connected to each other using an extension plate of the Ilizarov set to facilitate the application of traction (Fig 1a, 4a). The ring of the customised Thomas splint thus created will be covered with a foam. Once all the connection are ensured for tightness, cotton bandages are used to create the sling with adequate slackness, depending on the side of the limb which is being treated. All the precautions required during the application of fixed traction using Thomas splint are carefully followed, particularly avoiding the external rotation of the limb (Fig 1b, 4b). Following application of modified Thomas splint, check radiographs were taken to ensure adequate alignment of the fracture fragments (Fig 2a, 2b and Fig 5a, 5b). Following 3 weeks of traction, hip spica cast was applied for another 6-8 weeks depending on the fracture pattern. Check x rays were taken after final removal of hip spica at 10-12 weeks (Fig 3a,3b and Fig 6a,6b).
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Figure 1 - Modified Thomas splint constructed by using parts of Ilizarov fixator (a), and its application with fixed traction for a child with fracture shaft of femur (b).

Figure 2 - Check x-ray anteroposterior (a) and lateral (b) views after application of fixed traction using modified Thomas splint.

Figure 3 - 12 weeks follow up x ray anteroposterior (a) and lateral (b) views showing fracture union.

Figure 4 - Customized Thomas splint using parts of Ilizarov ring fixator (a) and its application to a child with fracture shaft of femur (b).

Figure 5 - Anteroposterior (a) and lateral radiograph of the child immediately following application of modified Thomas splint.

Figure 6 - At 10 weeks follow up, check x rays showing fracture union in both anteroposterior(c) and lateral views(d).
Discussion

Traction and spica casting is a safe and cost-effective treatment option for closed femoral shaft fractures in children aged below 6 years. [4] A Thomas splint of appropriate size to the given patient can provide an effective traction in the initial treatment period. Unfortunately, it is not possible to obtain an appropriate size Thomas splint in all clinical set up. It will be an ideal situation where the surgeon has control over the fabrication of a customised Thomas splint using readily available materials of orthopaedic practice.

The modified Thomas splint described here by the authors will address some of the fallacies encountered during the usage of the conventional Thomas splint. In addition, the described Thomas splint also scores over the conventional splint by being more image friendly during check radiographs or fluoroscopic examination because of the low profile nature of the threaded rods and the smaller width of the metallic or carbon fibre rings. The splint can also be dismantled completely, cleaned or autoclaved before reapplication to other patients. Finally, it will be a cost effective method as the required materials for fabrication of this splint are chosen from a reusable set of the Ilizarov system.

Conclusion

To conclude, the modified Thomas splint described above can be a handy tool to customise an appropriate size splint for initial traction during conservative management of pediatric femoral shaft fractures.

References