Abstract: For years Bryant's method of traction has been used in management of femur fractures in children under 2 years. However, the construct of Bryant's traction is cumbersome and difficult to maintain occupying a large amount of space. Feeding, comforting and perineal care of the children were also difficult leading. Several modifications of Bryant's traction have been described to make the construct less cumbersome and easier to use. We describe a modification of Bryant's traction, simple and portable. The portable version of Bryant's traction is made using a Thermacol sheet, Earthatflex foam and a Light-weighted aluminium frame. The clearance of the child's buttocks just off the bedding was considered sufficient traction. The neonates were managed in Neonatal ICU with phototherapy, nursing care and feeding in no way hindered by the traction. Compliance of the children and parents were better in older children. The only complications noticed were the frequent loosening of the traction and occasional development of skin blisters.

Only Patients, below 2 years and weighing below 20kg, with femur shaft fracture and post-arthrotomy septic arthritis of hip were provided traction in this frame. This even facilitated breast feeding by the mother in case of infants, and also better nursing care. The child can be transported without removing or disturbing the traction and can also be transported for investigations like ultrasound. Most importantly, none of the cases had any ischaemic injury. Our modified version of Bryant's traction is a compact, light-weighted and portable device with high safety and efficacy profile and most importantly good compliance from the child and the parents. They can be used in selected cases of femur shaft fractures and post-arthrotomy septic arthritis. Their efficacy in managing different stages of developmental dysplasia of hip is to be tested.

Keyword: Bryant's Traction, Pediatric Femur fractures, Septic arthritis

PORTABLE VERSION OF BRYANT'S TRACTION
INTRODUCTION
In 1839, John Haddy James described traction as a method of fracture treatment. By means of ‘continuous tolerable traction... by weigh and pulley’ (Jones, 1953). In infants, we frequently encounter femur fractures and septic arthritis of the hip. For years, Bryant’s traction has been used in management of these conditions. Bryant (1880) described a method of traction, popularly known as Gallows traction, for treatment of femur shaft fractures in infants. Management of infants with femur fractures using Bryant’s traction, based on pulleys and weights, is cumbersome and difficult to maintain. Apart from that parents had difficulty in reaching the children and comforting them. Feeding the infants were also difficult leading to use of katori feeding. Several modifications of Bryant’s traction have been described to make the construct less cumbersome and easier to use. We describe a modification of Bryant’s traction, which is not only simple and portable but also well adaptable to the activity and hygienic problem. We describe this modification of Bryant’s traction for use only in infants.

Portable version of Bryant's traction

METHODOLOGY Our modification of Bryant’s basically constructs of a frame measuring about 60cm in height and 40cm wide, made of light-weight aluminum. The frame is strapped, fitted and centered over a 75x40x2cm Thermacool sheet layered on the upper side with Earthaflex foam. The setup was then coated with Resin to make it water proof. Before applying the traction, the lower limbs are padded well mainly covering the knees and malleoli. Non-adhesive skin traction straps are applied to the medial and lateral aspects of the lower limbs. Above the foot, the straps are attached over a spreader to avoid pressure over the malleoli. To apply traction, the rope attached through the spreader is tied over the aluminum frame, with the children in supine position. The rope is adjusted based on the limb length of the child, such that the child’s buttocks just clear the bedding. This clearance was originally described by Bryant’s in his method, as indicative of sufficient traction. After application of the traction, careful attention is paid to circulation (capillary refilling) and monitored for the first 2 days. The free ankle movement of the child is checked thrice everyday and any loosening corrected. The traction was maintained for the entire treatment period.
Neonate on traction in Neonatal ICU

The method facilitates perineal care and does not depend on the patient’s cooperation. Unlike the traditional method of Bryant’s traction, in which the child can be accessed in bed only from the sides, the child can be accessed all around during this method of traction. This even facilitated breast feeding by the mother, and also better nursing care. The traction unit with the infant can be placed next to the mother on the mother’s bed, as they do not occupy much space and hence are not distanced from the mother. The neonates, managed in Neonatal ICUs, were provided traction in the phototherapy units and easily transported for investigations like ultrasonogram without disturbing the traction.

Two of the patients developed superficial skin blisters as a result of inadequate padding of the lower limb. The blisters were managed by adjustment of the paddings along with the traction and bandages. Only neonates and infants, with femur shaft fracture and post-arthrotomy septic arthritis of hip were provided traction in this frame.

The parents are actively involved in the management of the child by means of educating them in assessment of the child periodically, especially the comfort level of the child, deformity of the injured limb, colour and sensation of the injured limb. And they are also educated in safely transporting the child without disturbing the traction. They are mainly educated to ensure that the child’s buttock is clear of the bedding during the entire duration of the traction. 3 cases of femur shaft fractures were treated by means of the modified Bryant’s traction. All the fractures were oblique or spiral fractures. Once fracture became sticky and proper alignment was obtained at the end of about 10 days, the child was put on a hip spica cast. 2 cases of post-arthrotomy septic arthritis of hip were also treated by means of the traction. The post-arthrotomy septic arthritis of hip cases was put on a hip spica cast after 2 weeks of traction.

In the fractures of femur treated by the modified Bryant’s traction, there were acceptable degrees of minor angulations. The remodeling capacities of the children were expected to overcome these angulations as they grow. The cases of post-arthrotomy septic arthritis hip had regular wound inspections without the need for disturbing the traction. None of the cases had any ischaemic injury.

DISCUSSION Bryant’s traction and its modifications, that have been described so far, are cumbersome, occupying a relatively large space, distancing the parents from the child and not portable. Our modification of Bryant’s traction overcomes all the drawbacks of the other tractions, especially its easy portability. Bryant described that on putting the child in traction,
the criteria for sufficient traction was clearance of the child’s buttocks from the bedding. We were able to consistently maintain sufficient traction while using our modification of the Bryant’s traction, indicating its efficiency.

USG being done on a child without disturbing the traction
Parents and children had good compliance with this method. Parents were given the responsibility in managing the infants on traction in wards. Parents were able to transport their children without disturbing the traction, and also nurse and feed them. There have been a number of reports of vascular complications leading to ischaemic fibrosis of calf muscles and even gangrene in some cases following Bryant’s traction in children 3 to 8 years old. (Thompson and Mahoney, 1951; Miller et al, 1952; Nicholson et al, 1955; Lidge, 1959) The pressure and vascular complications are worst feared, attributed to the vertical positioning of the lower limbs leading to increased hydrostatic pressure, excessively tight leg wrappings and hyperextension of the knee. And stress on monitoring the circulation and sensations have been made from time to time. None of our cases had any ischemic injury.

Portable traction on a phototherapy unit
The prime goal of good end results in the absence of complications was achieved in our patients. Simplicity with efficacy and safety was the main advantage seen in our modification of Bryant’s traction. Other methods of skin traction were cumbersome and occupied a lot of space with difficulty in transporting the patients. The portability of the traction itself advocates domiciliary management of children with proper training to the parents in future. Hence saving money spent towards prolonged hospital stay. Unlike the original Bryant’s traction, our modification is not a balanced traction. We encountered no problems in treatment of the femur fractures and post-arthrotomy septic arthritis hip, since we employed our modification of the Bryant’s traction only in neonates and infants. More cases are needed to be treated with the modified version of Bryant’s traction and long term follow-up is required. The prime goal of good end results in the absence of complications was achieved in our patients. Simplicity with efficacy and safety was the main advantage seen in our modification of Bryant’s traction. Other methods of skin traction were cumbersome and occupied a lot of space with difficulty in transporting the patients. The portability of the traction itself advocates domiciliary management of children with proper training to the
parents in future. Hence saving money spent towards prolonged hospital stay. Unlike the original Bryant’s traction, our modification is not a balanced traction. We encountered no problems in treatment of the femur fractures and post-arthrotomy septic arthritis hip, since we employed our modification of the Bryant’s traction only in neonates and infants. More cases are needed to be treated with the modified version of Bryant’s traction and long term follow-up is required.

Child comfortable on the portable traction unit
CONCLUSION Our modified version of Bryant’s traction is a compact, light-weighted, safe and efficient portable device and most importantly with good compliance from the child and the parents. They can be used in selected cases of femur shaft fractures and post-arthrotomy septic arthritis in infants, initially at the hospital and later in wards with proper training of the parents.

REFERENCES


2 Bryant T. On the value of parallelism of the lower extremities in the treatment of hip disease and hip injuries, with the best means of obtaining it. Lancet 1880; i: 159.


