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Comparison of Pediatric and General Orthopedic Surgeons' Approaches in Management of Blount's Disease and Torsional Malalignment Syndrome

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Abstract

Background: Orthopedic disorders of children are regularly managed by both general and pediatric orthopedists, practically, with various diagnostic and therapeutic approaches.
Objectives: The purpose of this study was to compare these two groups of surgeons regarding consensus and viewpoint variety on Blount's disease and malalignment syndrome.
Methods: A nine-item questionnaire was designed and different choices were provided for each question to cover the main management strategies. Forty surgeons in two groups of general orthopedic surgeons (GOS) (n = 20) and pediatric orthopedic surgeons (POS) (n = 20) participated in the study and they were asked to choose answers by an electronic keypad. Statistical analysis was performed with Chi-square and Fisher's exact tests.
Results: For unimproved Blount's disease after one-year application of leg brace, 85% of POS vs. 31% of GOS tended to perform osteotomy, mostly with pin and cast fixation. In case of recurrence, re-osteotomy and temporary hemiepiphysiodesis were most popular. For further work-up of typical Blount lesion in X-ray, 73% of POS and 36% of GOS would perform an MRI. For a child with asymptomatic torsional malalignment syndrome, 75% of POS and 78% of GOS voted against surgery; while, for a symptomatic patient, femoral and tibial osteotomy was the choice.
Conclusions: Disagreements among orthopedic surgeons imply inadequacy of level-1 evidence. More comprehensive investigations are necessary to elucidate the situation.

Keywords: Blount Disease, Consensus, Pediatrics, Torsional Malalignment Syndrome

1. Background

Pediatric musculoskeletal disorders comprise one-fifth to one-third of visits to primary care units (1, 2). Although trauma accounts for most of these cases, developmental and idiopathic orthopedic conditions are also highly frequent that are routinely referred to and managed by both general orthopedic surgeons and pediatric orthopedic surgeons (3). Considering the possible difference in diagnostic and therapeutic approaches between these two groups, it is rational to evaluate whether there is any congruity on variety of cases. Practicing the valid agreed-upon methods probably minimizes chances of malpractice and subsequent medico-legal troubles, especially when physicians with different (sub) specialties are involved (4).

In this study, we focused on two entities that are associated with many uncertainties: idiopathic tibia vara (or Blount's disease) and torsional malalignment syndrome (also called miserable malalignment syndrome). Blount's disease is a developmental disorder that affects the posteromedial portion of the proximal tibial growth plate and is associated with various and internal torsion of the tibia, often with shortening (5, 6). Torsional malalignment syndrome is usually a combination of femoral anteversion and excessive outward tibial rotation, as well as medial rotation of the knee motion axis, patellofemoral malalignment, chondromalacia, patellar subluxation, and dislocation (7, 8).

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2. Objectives

The present investigation was designed to assess the extent of consensus between general and pediatric orthopedic surgeons on cases of Blount's disease and malalignment syndrome.

3. Methods

A nine-item questionnaire was designed by a pediatric orthopedic surgeon and a general orthopedic surgeon (Table 1). The survey was performed during the annual joint meetings of Iranian orthopedic association and Persian orthopedic trauma association (POTA) at Tehran University of Medical Sciences in 2015. Forty participants from the audience were selected and classified in two groups: 1) pediatric orthopedic surgeons (POS) (n = 20) and 2) general orthopedic surgeons (GOS) (n = 20). In each group, half of the participants had more than 10 years of experience and the other half had worked for at least one year. General orthopedic surgeons had an orthopedic surgery board certificate without any further subspecialty fellowship. The voting process was conducted using electronic keypads and the participants were asked to answer each question with a single choice.

Statistical analysis was performed using SPSS software (version 19.0; IBM Corp., Armonk, NY). All frequencies are expressed as percentage. The Chi-square and Fisher's exact tests were performed to compare variables. P values < 0.05 were considered significant.

4. Results

In response to the next step for a 4-year-old child with Blount's disease and a history of 1-year long leg brace without improvement (Figure 1, Q1), 85% of the pediatric orthopedic surgeons tended to choose osteotomy method, while only 31% of general orthopedic surgeons chose osteotomy (Fisher's Exact test, P < 0.007). Osteotomy with pin and cast fixation was more favorable in both groups compared to the plate or screw fixation (74% vs. 11% in POS; 23% vs. 8% in GOS).

For osteotomy of fibula in "Blount's disease" (Figure 1, Q2), proximal osteotomy was more preferred by pediatric orthopedic surgeons (45%); yet general orthopedic surgeons mostly picked either distal (44%) or proximal (38%) osteotomy. None of the surgeons in both groups selected PTFL (Proximal Tibiofibular ligament) release (P = 0.68).

After union of osteotomy in "Blount's disease" (Figure 1, Q3), brace was recommended by 53% of pediatric and 61% of general orthopedic surgeons (P = 0.73).

Table 1. Nine-Item Questionnaire

No.	Blount's Disease
Q1	What's the next step in a patient (< 4 years old) with "Blount's disease" and a history of long leg brace for 1 year without any improvement?
	A. Continuing brace treatment
	B. Osteotomy with pin and cast fixation
	C. Osteotomy with plate and screw fixation
	D. Hemiepiphysiodesis with 8-plate
	E. Observation without treatment until 4 years of age
Q2	For osteotomy in "Blount's disease", what do you do for fibula?
	A. Nothing for fibula
	B. Proximal fibular osteotomy
	C. Distal fibular osteotomy
	D. Release of PTFL
Q3	Do you recommend brace after union of osteotomy?
	A. Yes
	B. No
Q4	What's the next step if the various deformity of "Blount's disease" recur after osteotomy?
	A. Brace
	B. Re-osteotomy
	C. Temporary hemiepiphysiodesis
	D. Permanent hemiepiphysiodesis
	E. Observation
	F. Ilizarov
Q5	What's the next work-up in a patient with genu varum and typical Blount lesion in knee X-ray images?
	A. MRI
	B. Arthrography
	C. CT scan
	D. Nothing
Q6	What is your choice for a 7-year-old patient with Blount lesion besides abnormal medial physis and depressed medial tibial plateau in X-ray?
	A. Subtubercular osteotomy
	B. Supratubercular osteotomy
	C. Condylar elevation osteotomy
	D. Medial epiphysiolysis and osteotomy
	E. Lateral epiphysiodesis and osteotomy
Q7	Would you perform elevation osteotomy in a patient (> 6 years old) with medial physeal slope > 30° and Langenskiold stage > IV?
	A. Yes
	B. No
	Malalignment Syndrome
Q8	In an 8-year-old boy with asymptomatic torsional malalignment syndrome, would you recommend the surgical approach?
	A. Yes
	B. No
Q9	If a patient was symptomatic and in need of surgery, what would be your surgical approach?
	A. Femoral and tibial osteotomy
	B. Femoral osteotomy
	C. Tibial osteotomy
	D. I would not do the surgery

In case of "Blount's disease" recurrence after osteotomy (Figure 1, Q4), re-osteotomy and temporary

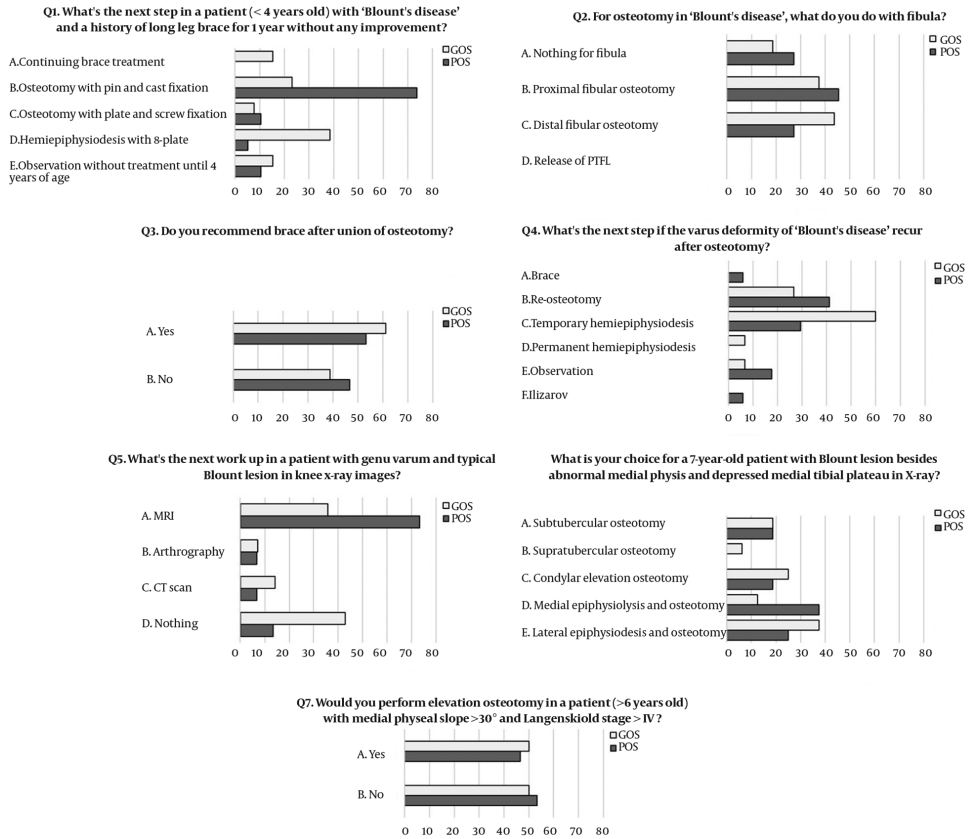

Figure 1. Pediatric and General Orthopedic Surgeons' Responses to the Q1 - 7 (Blount's Disease)

hemiepiphysiodesis were two frequent answers in both groups (87% of GOS and 71% of POS, P = 0.28). Re-osteotomy and temporary hemiepiphysiodesis were more favored by pediatric (41%) and general (60%) orthopedic surgeons, respectively.

For further work-up in a patient with genu varum and typical Blount lesion in knee X-ray images (Figure 1, Q5), the majority of pediatric orthopedic surgeons agreed on MRI (73%), while only 36% of general orthopedic surgeons would perform an MRI (P = 0.19). A great percentage of general orthopedic surgeons (43%) preferred to do nothing for further work-up, whereas this was an option for few (13%) pediatric orthopedic surgeons.

The opinions were versatile for a 7-year-old patient with Blount lesion besides abnormal medial physis and depressed medial tibial plateau in X-ray (Figure 1, Q6). The most commonly applied method was medial epiphysiolysis and osteotomy (38%) among pediatric orthopedic surgeons, whereas it was lateral epiphysiodesis and osteotomy (38%) among general orthopedic surgeons (P = 0.57). Supratubercular osteotomy was the most unpopular modality (6% in GOS and 0% in POS).

Nearly half of each group (50% of GOS and 47% of POS) concurred with performing elevation osteotomy (Figure 1, Q7) in a 6-year-old patient with medial physeal slope > 30° and Langenskiold stage > IV (P = 1.00).

Majority of surgeons (75% of POS and 78% of GOS, P = 1.00) voted against surgical approaches in an 8-year-old boy presenting with asymptomatic torsional malalignment syndrome (Figure 2, Q8). In response to the question of surgical approach in a symptomatic patient (Figure 2, Q9), femoral and tibial osteotomy was the most frequent answer in both groups (92% of POS and 71% of GOS, P = 0.23).

5. Discussion

This study was designed to examine the current opinion of Iranian orthopedic surgeons on two of the most common orthopedic problems. There were several disagreements between the two groups generally. Our findings show the necessity of an expert consensus in the country for controversial subjects of pediatric orthopedics.

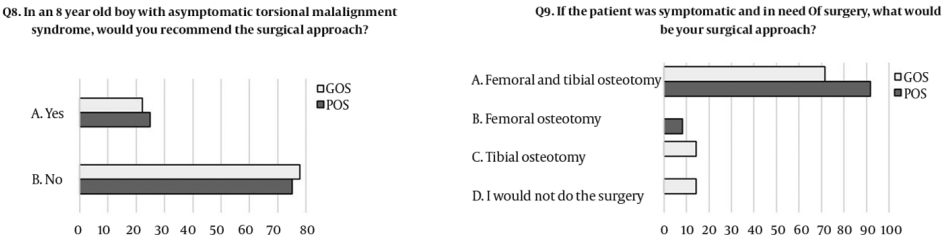

Figure 2. Pediatric and General Orthopedic Surgeons' Responses to the Q8 - 9 (Malalignment Syndrome)

There was a high diversity in response to the questions concerning Blount's disease; this was expected because there are many uncertainties in this topic as demonstrated in previous studies (9, 10). For instance, although long leg bracing has been used in children with Blount's disease, its efficacy has not been established in a controlled trial (11, 12). Even some found no effectiveness for brace treatment (13).

The mainstay of surgical treatment of Blount's disease in the past was acute correction using a proximal tibial osteotomy (9, 10). In this study, pediatric surgeons had a concurrence on osteotomy with pin and cast fixation, while the plate and screw fixation was not commonly selected. This was possibly because of the nature of the Blount's disease that occurs at the posteromedial proximal tibial physis. Using a plate near the physis is technically difficult and may create the risk of interfering with growth. On the other hand, performing osteotomy and fixation in the diaphysis could result in Z-deformity. Therefore, many preferred the pin and cast fixation in this study.

The possibility of neurovascular injury and inability to address associated limb shortening in proximal tibial osteotomy forced surgeons to seek for other treatment modalities (9). Hemiepiphysiodesis and guided growth is another choice made by general orthopedists in our study. There is limited evidence in support of the epiphysiodesis in early-onset Blount's disease (14). However, previous studies mainly conducted in late-onset cases reported less effective correction of children with genu varum secondary to Blount's disease possibly because of the abnormality of proximal medial physis (9, 15, 16).

Elevating the medial tibial plateau in early-onset disease was also controversial in this study as ell as in the literature. Severe early-onset Blount's disease is often accompanied by depressed medial tibial plateau and delayed ossification of the epiphysis, adjacent physis, and metaphysis that explains why some have recommended elevating the medial tibial plateau (17). In 2012, Sabharwal and colleagues showed that thickness of the chondroepiphysis of the proximal medial aspect of the tibia as well as height and width of the medial meniscus increase in children with Blount's disease. This finding shows that the diminished height of the ossified portion of the medial proximal aspect of the tibia could be recovered with this compensatory hypertrophy (18).

Medial epiphysiolysis and osteotomy was mainly picked by pediatric orthopedic surgeons. We speculate that general orthopedists do not use this technique very often because it is difficult and technically demanding.

In the torsional malalignment syndrome, conservative management is recommended in all cases except severe ones (7). Some indications for surgical treatment are age > 8 years, medial hip rotation $> 85°$, and lateral tibial torsion $\geq 30°$ (7). In this study, surgeons in both groups chose double-level osteotomy (femoral and tibial osteotomy) for symptomatic patients. Surgically rotating the tibia, alone, is not usually sufficient because the passive external rotation of the femur is not enough to accommodate the operatively-internally-rotated tibia (7).

Similar studies covering a wider spectrum of pediatric orthopedic topics, involving greater number of specialists and within normalized contexts, can shed further light on the issue whether in a national or in an international scale. The resultant information helps us appraise the current situation and may necessitate revisions of orthopedics training curricula aiming to achieve a better consensus and thus a higher treatment efficacy. Disagreements between general and pediatric orthopedists on diagnostic and therapeutic approaches demonstrate a lack of level-1 evidence even for the most common cases of pediatric orthopedics. We propose preparation of a dedicated comprehensive guideline for pediatric orthopedics based on the existing evidence to attain a convergence of expert viewpoints.

Footnote

Authors' Contribution: All authors were involved in designing the study, analyzing the data, writing the draft,

and critical revision of the manuscript. Study supervision, Ramin Haj Zargarbashi.

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