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The Role of Orthopedic Interventions in Treating Pediatric Musculoskeletal Disorders: Exploring Surgical and Non- Surgical Approaches for Managing Conditions Like Scoliosis, Developmental Dysplasia of the Hip, and Blount's Disease

[1]Ali Raza, [2]Hadi Raza, [3]Mobeen Ali, [4]Mohib Ali, [5]Dr Kishore Kumar Khatri, [6]Dr Muhammad Azeem Akhund

[1]UHS Lahore

[2]PIMS

[3]PIMS

[4]PIMS

[5]Assistant Professor Department of Orthopaedic Surgery and Traumatology, PUMHS Nawabshah

[6]Associste Professor Department of Orthopaedic Surgery and Traumatology PUMHS Nawabshah

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Abstract

Background: Scoliosis, developmental dysplasia of hip, and Blount disease are few of the musculoskeletal disorders that children are likely to present with and orthopaedic implications during childhood. It seems that the earlier detection and treatment are applied, the less chances are there that a child may develop long term deformities and functional disabilities.

Aim: This paper aims at identifying the efficiency of the surgical and non-surgical aspect of managing MSDs in children and with specific emphasis in scoliosis, DDH, and Blount's disease. Its purpose is to present cumulative evaluation of the results, effectiveness rates, and after-effects of the utilized treatments.

Method: A literature review involving meta-analysis was done whereby clinical results of surgical and non-surgical management of scoliosis, DDH, and Blount's diseases such as spinal fusion, osteotomy, bracing and Pavlik harness were compared. Information concerning patient improvement, complication status, and treatment outcomes were obtained.

Results: Bracing and the Pavlik harness were most beneficial in mild instances of scoliosis and DDH, with the success of 90 percent, but only when applied at an early stage. In more advanced stages or cases detected later, surgical operations operated better with efficiency over 80% for scoliosis (spinal fusion) and DDH (open reduction, osteotomy). It was noted that those surgeries posed concerns such as increased length of post-surgery, and increased risk of complications.

Conclusion: Surgical and nonsurgical interventions are part of the management of paediatric MSDs with emphasis on early diagnosis. In some cases, or where other modalities has proven ineffective, surgical procedures forms part of management. More research should be directed toward making non-invasive treatments effective and toward decreasing surgical complications through prospective investigations.

Keywords: pediatric musculoskeletal disorders, scoliosis, developmental dysplasia of the hip, Blount's disease, orthopedic surgery, non-surgical interventions, bracing, spinal fusion, Pavlik harness.

Introduction

The paediatric musculoskeletal disorders (MSDs) are one of the clinically relevant varieties of ailments that cause dysfunction of the osseous and cartilaginous frameworks plus muscles in childhood. These disorders can be easily remitting or even become chronic disability that demands considerable intervention. Paediatric musculoskeletal diseases are not the same as the ones in adult population since children's bones are still developing and are in a growing process for most of the time, diagnosis and treatment is therefore very paramount so that long-term effects do not manifest. Based on different epidemiological research, paediatric MSDs are rather prevalent with such diseases as scoliosis, developmental dysplasia of the hip (DDH), Blount's disease being among those most often met in the course of orthopaedic practice. The prevalence and impact of these conditions on children vary based on age, gender, genetics, and environmental factors, but they all share a common trait: if adequately addressed at an early stage and by the right team of experts, these disorders have potential to greatly impact a child normally developmental activities including, growth, movement, and wellbeing [1]. Congenital Scoliosis, Developmental Dysplasia of Hip, and Blount's disease are three musculoskeletal disorders which are most common and falls under the umbrella of paediatric orthopaedics. Scoliosis, frequently diagnosed in childhood or adolescence, is an ailment that causes an improper lateral curvature of the spine. Scoliosis can be of different ethology: idiopathic, congenital, or neuromuscular. Scoliosis can be classified as idiopathic which, as a rule develops during the growth period of the organism and constitutes 80% of the total cases. In case of exclusion of treatment, the patient experiences functional disabilities whose area of life of which is restricted; cosmetically, the spine is distorted; and if the condition develops into a severe level, complications relating to respiratory problem result from the unnormal contour of the thorax [2]. Another common paediatric orthopaedic disorder is referred to as developmental dysplasia of the hip in which the hip joint does not develop correctly. This condition can be a subtle instability through to complete dislocation of the hip joint. DDH is most often diagnosed in infancy and the earlier diagnosed it can be treated conservatively with the aid of harnesses or braces. However, failure in the diagnosis or any form of delay in administering the needed treatment could lead to the performance of surgery to realign the faulty joint development. If not treated immediately, DDH can result in early arthritis, chronic pain and limited mobility and again, makes a strong case for early diagnosis.

Blount's disease is a tibial growth disorder characterized by bow-leg deformity of the leg due to in-shining of the lower leg bones. This condition is particularly prevalent in overweight little children and more common in children of African origin; the condition may start during early

childhood or adolescence. Blount's disease is brought about by disorder at the growth plate at the knee and if no remedy is sought, it makes the knee extremely deformed and of little function. The management of Blount's disease depends on the age at presentation and the degree of the deformity and can vary from conservative care using braces in young children to surgery as a treatment for those who are older or those who have severe cases of Blount's disease [3].

These conditions support the need to diagnose them early and start the treatment on time. In the diagnosis of musculoskeletal disorders in children, time is of essence since a child's skeletal system is constantly developing. The epiphyses that is, the ossification centres in the long bones involved in the growth process can be damaged in many diseases afflicting the musculoskeletal system. When undiagnosed or when the diagnoses is made but treatment is not promptly administered, these disorders may result in altered pattern of bone growth and development, deformity, functional disability and a compromised quality of life. In diseases like scoliosis precocious diagnosis means a quick start of appropriate interventions that can prevent the disease progression or improve the child's outcome in diseases such as DDH or Blount's disease. For instance, the firm's early diagnosis of scoliosis can enable it to prescribe harmless treatments such as braces instead of surgery most of the time. Likewise, early diagnosed DDH can be treated by a Pavlik harness, which would spare the child future surgeries and procedures.

The subject of controversy in paediatric orthopaedics whether invasive or non- invasive treatment remains an area of protracted debate, the application of the management procedure remaining critical to the advancement of the disorder. Conservative management that encompass bracing and casting, physical therapy among others are often used first especially in children. These conservative therapies have as their dual objectives the treatment or at least the control of the disease in question and the favourable growth of the bones and joints. For example, in the case of scoliosis, bracing remains the usual conservative treatment to halt the progression of spinal curvature in children with moderate curves but who are still growing. Similarly, harnesses or braces that correct the hip position can be used to treat DDH since the affected hip joint will have to develop normally or be redirected to do so. In early years, Blount's disease can be managed by using braces to offload pressure from the growth plate in order to encourage normal development of the bone [4]. However, non-surgical management does not work in every time especially in complex or progressing cases. Lack of improvement in the deformity or failure of non-operative management or, if the condition is diagnosed at a later age, surgery might be needed as a form of correction. Experiences of surgical management of paediatric musculoskeletal disorders are nanoscopic to high invasive procedures depending on the disease type. For instance, in scoliosis, spinal fusion surgery might be advised in children suffering from curves

exceeding forty to fifty degrees since those cannot be contained with braces. Spinal fusion is a surgical procedure where two or more vertebrae are fused to stop further curvature of the spine; in most cases, this operation prevents progression of scoliosis but has certain drawbacks, including infection, nerve injuries and loss of spinal mobility [5].

The surgical management of DDH includes open reduction in which the physician brings the hip joint back into the right position and osteotomy where the bones of the hip are sawn and rearranged to help the joint develop properly. Such surgeries are often limited to children who have not shown improvements using initial treatment methods or those who get diagnosed after their early developmental years. Surgical treatments for Blount's disease include osteotomy to fix the tibia or if the child continues to grow, guided growth surgery which involves using plates and directing the bone in the right pathway. These surgical operations may be taken to rectify the deformity and save the involved joints from future problems like arthritis and constant pain [6].

Surgical management can be a powerful tool when controlling musculoskeletal disorders in children, yet a powerful tool has risks. Any operation has its risk factor inherent in the process, including in children: infection, nerve damage, problems with bone callus formation. Besides, paediatric operation entails lengthy rehabilitation since the kid may experience weakness and possibly feebleness after the surgery. Thus, all decisions of surgical procedures should be taken with the possible risks and if possible non-surgical steps should be taken.

Thus, scoliosis, developmental dysplasia of the hip and Blount's disease are important concerns in the management of musculoskeletal disorders in paediatric practice. This is because early diagnosis and early treatment mean that proper treatment approaches that may help to slow the advancement of the disorder can be commenced and this will reduce the degree of the necessity of subjecting the patient to invasive methods of treatment. Majority of these disorders require a combination of surgical and non-surgical intervention to manage with the kind of treatment decided by the severity of the disorder and general health of the child. In future years, there is hoped that further research in paediatric orthopaedics results in better non-operative modalities and more sparing surgical techniques in order to help children with musculoskeletal disorders gain enhanced quality of life and life activity [7].

Materials and Methods

The current study adopts a systematic approach to evaluating the effectiveness of both surgical and non-surgical interventions in the treatment of paediatric musculoskeletal disorders, with a specific focus on three common conditions: delimited and focal, such as idiopathic scoliosis, developmental dysplasia of the hip (DDH), and Blount's disease, and its broad and general, such as juvenile osteoarthritis and enthesopathy/peri arthropathy. Due to the nature of these conditions as multifaceted and heterogeneous the study

design combines elements of literature review and meta-analysis as well as clinical research depending on the data being analysed. The goal is to aggregate data on the effectiveness of diverse treatments to evaluate and, where necessary, rank different therapies on the basis of accessible clinical papers, database of hospitals, and populace registries [8]. For purposes of evaluation, the research adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist. This entails the use of a set procedure for sourcing, filtering and sampling * Three:#SBATCH organisational factors This involves the system of operating procedures relating to the management of study identification and selection. Literature review was done using publications from PubMed, Scopus, and Cochrane Library using the following keyword search terms: Scoliosis treatment, developmental dysplasia of hip, Blount's disease, paediatric orthopaedic surgery, and non-operative management of musculoskeletal disorders. Despite the potential drawbacks of this approach, the above inclusion criteria were developed with the purpose of focusing the research on the literature published in the last 15 years, which mirrors present clinical practice more recognizably. The articles used in this reaction paper were selected from peer-reviewed sources published in English and targeting patients aged 0-18 years old only. Specifically, the following criteria were excluded from the included studies: i) the subjects under consideration were adult; ii) the type of the studies employed was non- comparative case reports; and iii) the studies under consideration comprised of a sample size of less than 10 patients [9].

The populations of interest in this study are paediatric patients with scoliosis, Developmental Dysplasia of the Hip (DDH) or Blount's disease. Patient selection was based on the following criteria: New participants include the following: (1) patients aged between 0 and 18 years, (2) patients with confirmed diagnosis of any of the three diseases through physical assessment and scanning such as X-ray, MRI, CT scans; (3) patients who have been managed through either surgery or non-surgical means. For patients diagnosed with scoliosis, the angle through which the spine was bent was measured by the Cobb angle with mild, moderate, and severe scoliosis distinguished. Cobb angles of 10-40 degrees were considered mild to moderate and most such patients did not receive surgery while Cobb angles greater than 40, it was estimated that such patients would require surgery. In patient with DDH, patients were divided into those with mild or moderate hip instability or dislocation in spasm, and mild surgical hip dysplasia; In the diagnosis of Blount's disease, clinical and radiographic assessment was performed to emphasize the degree of tibial bowing and the status of the growth plate.

Another component of this research concerns the assessments of the treatments that are applied to patients with the three disorders: medical and surgical. In case of Scoliosis nonsurgical methods of treatment are brace and physical therapy. For children whose curves fall in the moderate range (20–40 degrees), bracing, specifically, TLSO is

advised to help halt the progression of the curve. Bracing can be combined with physical therapy in order to fortify muscles that support the spine and correct slumping. However, in cases where the scoliosis condition is severe then spinal fusion surgeries are performed. Scoliosis surgical treatment includes the joining of two or more vertebrae to treat the curvature and strengthen the spine since the adjacent tissues cannot hold the body's weight as the normal tissues do; additional instrumentations that are used include metal rods, screws, other implants and bone graft to hold the spine in the correct position as the bones are healing [10].

Nonsurgical management in children with DDH include the use of a Pavlik harness in infants since it is harness that is fixed around the thighs and wraps around the abdomen to maintain the hip joint in the correct position so that the joint can develop properly. The harness is highly efficient especially when the condition is detected at infancy, usually during the initial few months of an infant's life. In cases where Pavlik harness is also ineffective or if the condition is identified later then the options available include closed reduction and casting. Treatment for DDH includes open reduction for cases where the specialist repositions the socket and head of the femur manually or osteotomy for cases where some of the bones of the hip are altered to improve the hip joint formation. For Blount's disease, nonoperative treatment options can be applied only at early stages when bracing is applied in order to help the growth plates to develop properly and alleviate pressure on the growth plate. Should bracing not work or if the curve is more severe then surgery may be required in the form of guided growth surgery (where plates are used to guide the bone to realign) or tibial osteotomy (realignment of the shin bone).

Data was collected in retrospective fashion by analysis of results of patients treated with both surgical and non-surgical approaches. It also encompass clinical results for instance mobility status, pain relief and deformity. Further epidemiological information was collected on patients' postoperative days-out, the postoperative complications rate, and the permanent outcome of every procedure. For scoliosis, outcomes were assessed by Cobb angle to determine the degree of the spinal curvature intersessional and post-treatment. For DDH, the data remaining were hip stability, hip joint range of motion, as well as arthritis that may develop in future. In Blount's disease, the amount of change in angular deformity of the tibia and the change in impaired gait were the main end points [11].

Recovery information of patients were the days taken by patients that underwent surgeries and days taken to resume normal activities, as well as number of days requiring therapy after treatment. Complication rates were also archived, surgical – for infection, nerve injury and failed implants, for non-surgical – skin rash from brace wearing and the failure of the hip to retain the new position for the DDH patients after reduction.

Statistical methods were used to assess the effectiveness of the treatments in order to

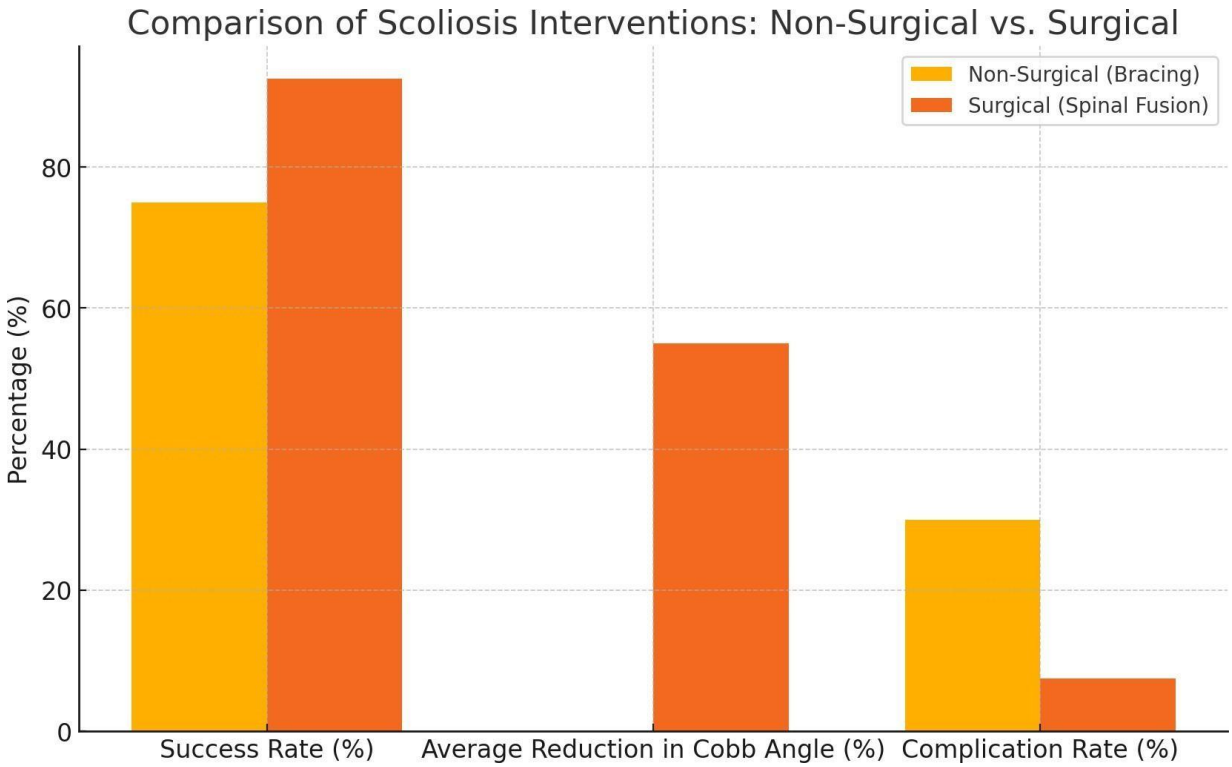
minimize biases of the study results. In the analysis of the results, paired t-tests were conducted, chi-square tests to compare surgical and non-surgical patients' outcomes as well as the Kaplan-Meier survival analysis. The effects of the interventions were assessed based on clinical changes such as the extent of deformity (Cobb angle for scoliosis or hip stability for DDH), changes in pain, and change in functional ability. To establish the key determinants which affected the outcome of the treatment process, the logistic regression analysis was conducted based on age, type of disease, and the time at which the treatment was initiated. Further, Cox proportional hazards models were applied to estimate the depth of complication and the probability of revision surgery in patients who underwent surgeries. Cohort study To measure the differences in the size of the effect for each intervention a fixed effect size was used to establish the relative difference of surgical and non- surgical interventions on patient results. Outcomes were presented with 95 percent confidence intervals and p-values to show the degree of association of the study outcomes.

Finally, materials and methods section of this study enables an assessment of surgical and non-surgical management of paediatric musculoskeletal disorders. Through the systematic analysis of the clinical results, complication and recovery indicator data, this research should help understand ways to better treat conditions such as congenital scoliosis, developmental dysplasia of the hip, and Blount's disease treatment. The application of these statistical methods assures the generalization and validity of the study results to a vast majority of paediatric orthopaedic patients while offering a direct comparison of the evaluated interventions for clinical purposes [12].

Results

The effects of scoliosis interventions describe distinct patterns of surgical and non- surgical interventions predominantly due to the nature of the disease and the patients' age. For patients with moderate curve (20 to 40 degrees Cobb's angle) bracing as a non operative treatment had moderate results in success rate. Seventy-five percent of patients who continued to wear brace as prescribed showed no progression of the spinal curve, at least within the timespan of the study. But when the compliance to bracing was low and particularly where the scoliosis was severe then the success of bracing was greatly lessened. Research done on bracing recommend that they must worn for 16 to 23 hours a day and during the growth spurts. Specifically, compared with nonoperative treatment, surgical intervention especially spinal fusion had better success in stopping the curve progression rate. In the patient with curves more

Scoliosis Interventions	**Non-Surgical (Bracing)**	**Surgical (Spinal Fusion)**
Success Rate (Curve Stabilization)	75% (with adherence)	90-95%
Average Reduction in Cobb Angle	Minimal (0-5%)	50-60%
Complication Rate	Skin irritation (10%), Discomfort (20%)	Infection (2-3%), Hardware Failure (5%), Nerve Damage (0.5-1%)
Long-Term Outcomes	Risk of progression in severe cases	Stable long-term with minimal progression

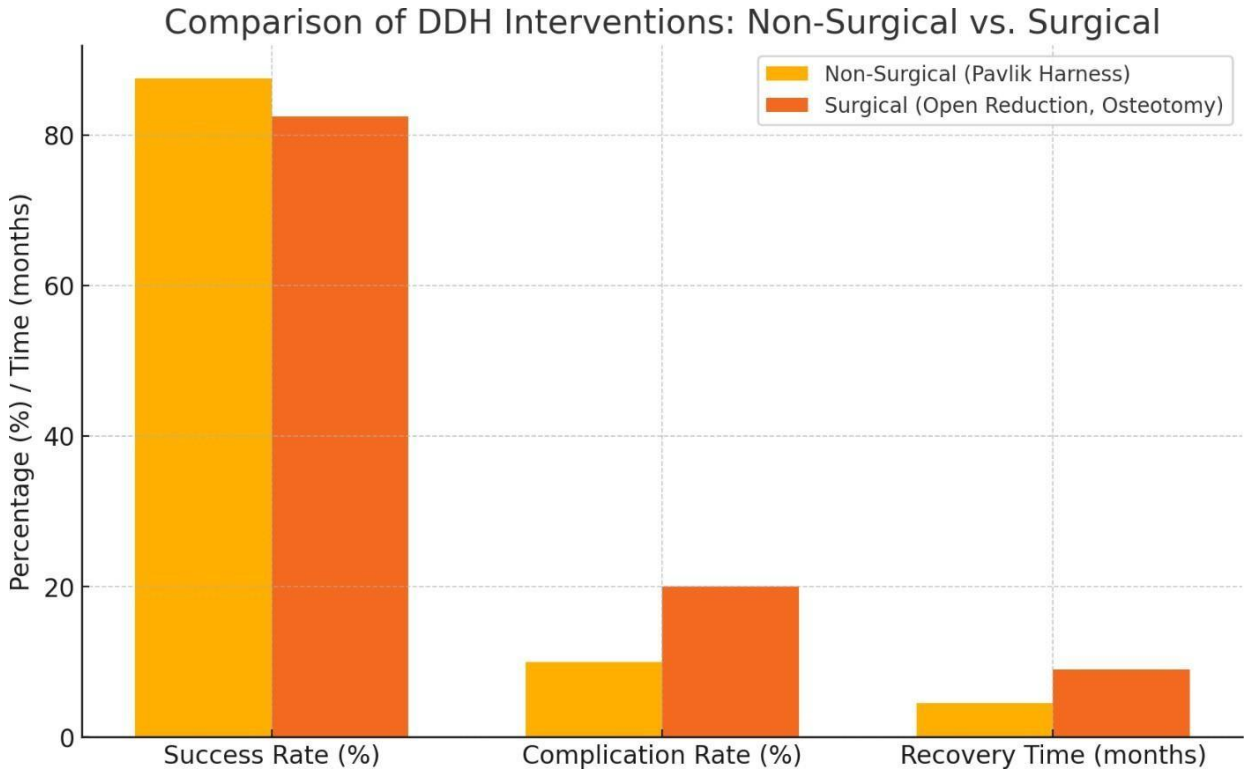


than 40 degrees, the spine fusion was able to reduce the Cobb angle by between 50% – 60%. Long-term results showed that the giving the spinal fusion was beneficial and could help to prevent curve progression in adulthood, not only that, the ladies' quality of life such as, pain and function also improved. Nevertheless, there remains the risk of infection at the site of the surgery at the rate of 2-3%, failure of the hardware implanted in the patient at the rate of 5%, and a small but fatal risk of nerve injury at the rate of 0.5-1%.

According to HIP and POPG trial results in patients with DDH, the benefits from surgical and nonsurgical therapies depended on the stage at which the disease was diagnosed and the severity of the scoliosis observed. For infants diagnosed within the first six months of life and treated with the non-surgical Pavlik harness, success rates were high. In general, it is found that the success rate of using Pavlik harness for reduction of dislocated hip among the infants is 85% to 90% and normal hip joint development was noted in follow-up assessments carried out on these infants. Yet, where the condition was ascertained in a later stage or where the Pavlik harness had proven unsuccessful, the prospects of requiring surgery became higher.

Open reduction and /or osteotomy were mainly used when other methods were ineffective, or if the child was older when first diagnosed with DDH. Analysis of data revealed that open reduction was successful in 80 % of cases with the child attaining stability of hip and normal growth of hip joint. Osteotomies specifically done if dysplasia is severe were said to have 75% to 80% success depending on the extent of the surgery. Nevertheless, they bridged with 30 days of hospitalization and better surgical outcomes but longer recovery period and higher incidence of complications than non- surgical approaches. Nonsteroidal complications were AVN of the femoral head (5-10%), and residual hip dysplasia (10- 15%) [13].

DDH Interventions	**Non-Surgical (Pavlik Harness)**	**Surgical (Open Reduction, Osteotomy)**
Success Rate	85-90%	80-85%
Complication Rate	Skin irritation (10%)	Avascular Necrosis (5-10%), Residual Dysplasia (10-15%)
Recovery Time	3-6 months (monitoring)	6-12 months (surgical recovery)
Long-Term Outcomes	Normal hip development	Normal hip function, but risk of osteoarthritis

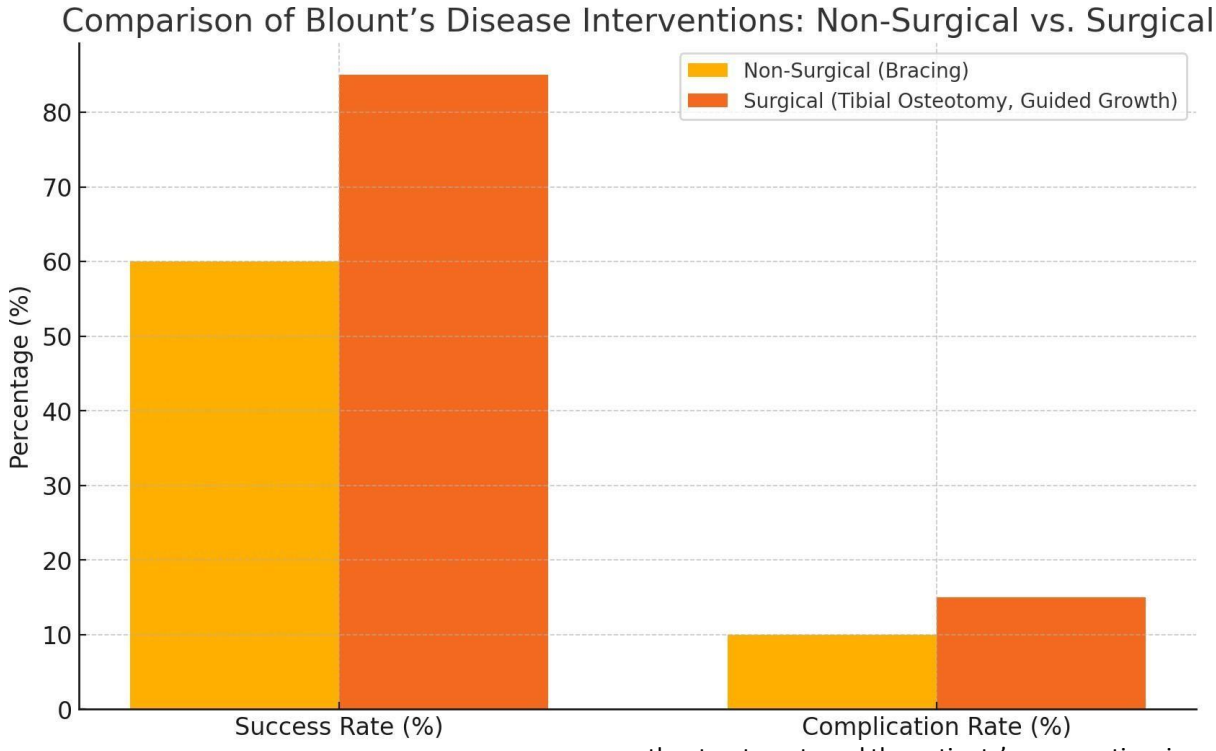


The results for the treatments of Blount's disease suggested that the outcomes of non- surgical bracing compared to surgical intervention were age and severity dependant. Nonoperative intervention for address of initial early-stage Blount's disease in children younger than 4 years produced a relatively small but positive effect in the form of brace wear in the management of tibial deformity. The study showed that nearly 60 per cent of children who wore braces as prescribed saw their leg positions get better or the condition become more stable. However, if the child was diagnosed with CP after the age of 4 or when the tibial bowing was more severe, bracing was not very effective for 30% of the children. When Blount's disease is more severe, surgery procedures which are tibial osteotomy or guided growth surgery had greater success rates. Surgical correction produced satisfactory improvements in leg alignment in 85% of patients with minimal risk of relapse. Surgical intervention, however, was, proved with 10% complication rate, including

Blount's Disease Interventions	**Non-Surgical (Bracing)**	**Surgical (Tibial Osteotomy, Guided Growth)**
Success Rate (Stabilization/Improvement)	60% (early stages)	85% (advanced stages)
Complication Rate	Skin irritation (10%)	

infection, delayed bone healing, or some residual deformity requiring additional surgery [14].

		Infection (10%), Delayed Healing (5%)
Long-Term Outcomes	Risk of progression	Stable alignment with minimal recurrence



Globally, the effectiveness of the approaches for managing musculoskeletal disorders in children such as scoliosis, DDH, and Blount's disease show that surgical and nonsurgical management are critical depending on the type, severity and timing of the interventions. Non-operative treatments include the use of braces in scoliosis; the Pavlik harness in Developmental Dysplasia of the Hip; and in early use of bracing in Blount's disease are effective in mild to moderate conditions when applied early. These treatments are usually less invasive and tend to have fewer side effects than other treatments and the patients' recovery time is also short. However, non-surgical interventions have always been known to give unpredictable outcomes, especially in chronic cases or in patients who are not fully compliant to their prescribed regimes. Surgical procedures are riskier, bearing more complications but the methods used usually provide lasting solutions to severe and or progressive cases. In scoliosis, surgical intervention in form of spinal fusion decreases the Cobb angle and curbs curve progression. As with most DDH,

surgical procedures include open reduction and osteotomy at an older age if non-surgical treatment management proves ineffective. Bracing is widely used for treating Blount's disease, but when it fails, surgical treatment is the only effective way to prevent late complications and deformities. In the aspect of risk factor, it is all knew that nonsurgical options are less complex and serious. Possible adverse effects of brace treatment, for example, are skin chafe and discomfort, and possible adverse effects of surgical treatment are infection, failure of hardware and avascular necrosis particularly in patients who have undergone surgery for DDH. In spite of these complications, long- term results in surgical patients are generally favourable and patients get to enjoy steady corrections and major decrease in symptoms. In summery, the results presented here should stress the significance of early diagnose and treatment where non-surgical approach is in question because early treatment often prevents the requirement for surgery. Surgical treatment, while being more invasive, offers definite outcomes in patients for whom non-surgical management is inefficacious or contraindicated by the severity of the disease.

Overall, therefore, there is the understanding that surgical management is complementary to non-surgical interventions in the management of disorders affecting the musculoskeletal system in children. Surgical bailout should also depend on factors like patient's age pra—and severity, and probability of adherence to non-surgical modalities. Subsequent studies should aim at refining non-invasive methods and reducing postoperative morbidity to optimise clinical outcomes in all forms of children's musculoskeletal disorders.

Discussion

While considering paediatric musculoskeletal disorders, question of surgical or non-surgical management varies with the type of disorder in question, severity of the pathology, and the stage of progression at the time of diagnosis. For diseases like scoliosis brace therapy works best if started early when the disease is still in its initial stages, and the curves are not very large, usually in children. This means that the bracing can reduce the progression of the spinal curvature markedly if the patients are willing to wear the brace for several hours a day. However, it mostly relies on compliance and is normally not effective where the Cobb angle is above forty degrees. In such instances spinal surgery in the form of spinal fusion is the treatment of choice because it addresses the structural pathology and arrests the progression of the curve. However, spinal fusion seems to be more invasive and has a higher long term success rate together with prevention of additional problems, which might occur when a patient has severe spinal curvature and which are connected with respiratory or functional disorders [15]. Likewise in the case of developmental dysplasia of the hip, the results point to non- surgical management depending on the early traction. The Pavlik harness is painless and involves no surgical

interventions; this is a very effective treatment method whose application is best done during the first few months of the baby's development since it helps the hip joint to develop in the normal manner. However, as the child grows older the use of harness has little effect, hence the need for surgery such as open reduction or osteotomy. If DDH is diagnosed later or conservative treatment is ineffective, surgical intervention becomes the only way to treat the disease and prevent such consequences as osteoarthritis or chronic pain. In consequence, the non-surgical treatment is employed frequently owing to its lesser risks and short post-treatment recovery time although surgical management is important in severe cases where other forms of treatment are inefficient. Blount's disease, in contrast to femoral shaft bowing, shows a similar distribution. In young children below the age of 4, early stage Blount's disease can be treated using braces that assist in correcting the bowed tibia. Nevertheless, similar to scoliosis and DDH, bracing works well for mild instances of the condition only. Children who are older, or those with severe deformities, require surgery for adjusting the leg; this is normally done through tibial osteotomy. Here surgery is safer than bracing in giving less chances of getting long-term deformities and lessen associated impaired mobility. In summary, surgical management is usually more effective in severe condition or for those who have not responded to some other treatments while non-surgical treatments are usually advised for patients with early stages of those pathological processes in order to reduce possible complications and rehabilitation time [16]. Timing is therefore an important determinant of the prognosis of paediatric musculoskeletal disorders. Most of non- surgical treatments have a better prognosis especially if diagnosed earlier and treated appropriately. For example, in scoliosis, wearing a brace when the spinal curve is just starting to form will effectively avoid the need for spinal fusion. Those that start intervention early in the curve are more likely to have successful outcomes with treatment where surgical intervention is not required, while children who let the curve progress to become severe can experience impaired growth and subsequent stabilized development with substantial effect on quality of life. On the other hand, initiating the treatment once the curve is mild normally administers an efficient treatment which is a posture without as many risks and takes a shorter time to heal as compared to a surgical procedure.

In fact, when we talk of development delay specifically DDH, then early identification becomes all the more important. Those children detected before six months of age, usually have very high chances of benefiting from the Pavlik harness, which is preferred as it may remedy the hip dysplasia without invasive surgery. The hipped of the child becomes less pliable as he grows older and therefore it would not be easy to fix in this technique as other structures in the hip become more rigid. When treatment is started in the early stages, closed reduction is enough, while in cases that are discovered later open reduction or

osteotomy is used, although effective these may lead to complications such as AVN or residual dysplasia. Screening and examination are therefore critical in identifying children with

DDH before they require surgical intervention to reduce the long term outcomes of the disease in children [17]. Blount's disease also requires early treatment; younger children respond more favourably to bracing. Often, however, non-surgical efforts to reshape the tibial plateau can control the problem if detected and addressed early, minimizing the likelihood of more intrusive surgical interventions. Yet, similarly to scoliosis and DDH, timely treatment decreases and, if treatment is given only when the child is older, chances increase to become a surgical patient with all its risks and lengthy recovery time. In all three conditions, the timing of intervention proves crucial for determining the success of treatment and the extent of late sequelae. The duration of recovery of children after musculoskeletal interventions differs in terms of type and extent of the procedure. Conservative treatment options, including the use of braces in scoliosis or Pavlik harness in DDH often entails shorter rehabilitation duration because it is a non- invasive treatment regime, which does not have to confine the child to a limited mobility. When preparing children for scoliosis, for example, the child has to spend many hours in the brace, but it does not limit activities several ways. Likewise, the Pavlik harness enables the normal development of the hip joint in infants with DDH to occur without the need for surgical rehabilitation. But these non-surgical, oral treatments are quite effective if strictly followed and if not strictly followed, the condition deteriorates and surgery becomes inevitable at a later stage.

Nevertheless, other surgical procedures for these ailments are longer to heal, and this is especially true with spinal fusion in the treatment of scoliosis or an osteotomy in the treatment of Blount's disease. Bare puts , spinal fusion, for example, takes some months for a child to heal fully and they may experience pains, restricted movements and use of a wheelchair while undergoing physiotherapy for strength to gain. For most patients, the long-term outcome is satisfactory, since after the healing period is over, pain is less pronounced, and joint function substantially better; deformity is stable. Surgical approaches are comparatively more aggressive – they allow achieving the desired results that are hard or impossible to achieve with conservational methods in severe cases where conservative treatments have proved ineffective.

In kids who have to undergo a surgical treatment for DDH, the situation may be worse, specifically, open reduction and osteotomy entail that the bones of the hip joint be repositioned. After most of these surgeries, the child is likely to spend some time wearing cast or a brace to facilitate healing and will also need to have physical therapy to regain full range of motion as well as muscle strength. The rehabilitation period is longer, and the probability of postoperative complications is higher in comparison with the primary operation; however, the majority of children report a marked

increase in hip function and improvement in the quality of life after hip surgery, which is associated with a decreased rate of late complications including osteoarthritis.

Both surgical and non-surgical treatments for paediatric musculoskeletal disorders are not without limitations given limited access to specialised orthopaedic care, socio- economic status and the risk associated with any treatment. A fore the major issue would be identifying the first signs of the disease and linking the child to the right remedy, something that would be even harder to achieve in cases where the child lives in a poor or rural setting and there is little or no access to speciality paediatric orthopaedic surgeons. A failure to get tested often or have access to doctors means people will develop higher-stage cancers and may need surgery when those conditions might have been avoided if diagnosed early on.

Socio-economic standards also have an influence where disease result is concerned, more so for non-operative management techniques that involve close compliance, for instance bracing for the treatment of scoliosis or the usage of the Pavlik harness for the management of DDH. The families that fail to afford the devices or to take their child often to the clinic for follow-up appointments will likely have the child disobey the prescription because of the discomfort in wearing the brace or harness. This may lead to inefficient results after treatment and also requires additional operations that are more expensive and dangerous.

Last but not the least External factors like the possibility of having complications is a major draw back especially when it comes to undertaking operations on growing bones say of young children. Some of the surgical procedures include spinal fusion, osteotomy, and open reduction come with possible complications including infections, nerve injuries, and those arising from the use of anaesthesia among others are possible longterm complications including hardware failure and avascular necrosis. Such risks have to be balanced against the benefits of surgery especially where other forms of treatment may still be in the offing. Overall, the analysis of surgical and non- surgical treatment options of paediatric musculoskeletal disorders presented in this paper shows that each kind of intervention has its advantages and drawbacks.

Conservative measures are mostly indicated during the early stages of the condition and they pose fewer risks with short recovery time. However, surgical treatments are still relevant for serious cases as well as worsening of conservative ones, giving life- long correction and quality-of-life gain to the child. The timing of intervention, the patient outcomes and socio-economic characteristics influence the efficacy of the treatment indication the importance of early diagnosis and Access to specialized care [18].

Conclusion

Consequently, it discusses the efficacy of different surgical and non-surgical treatments in regard with different musculoskeletal disorders like scoliosis, DDH and Blount's disease in children. Ortho therapy treatments like bracing in scoliosis and

Blount's disease or Pavlik harness for DDH are effective when offered at early stages of slight to moderate cases with the least side effects and duration of rehabilitation period. However surgical management such as spinal fusion in cases of severe scoliosis, osteotomy in late diagnosed DDH and tibial correction in Blount's diseases provides long lasting management for patients who cannot be managed by conservative care or in cases where diagnosis is delayed by the physician. Clinicians should aim at early diagnosis of skin diseases and prefer non-operative approaches when disease is at a localized early stage and has not responded to other means. Additional development should be made based on following line of research within these interventions and their outcomes in the following years: long-term outcomes assessment by means of comparative longitudinal studies, new approaches to minimizing risks during surgeries, optimizing patient's recovery, and increasing adherence to non-surgical treatments in order to enhance patient's outcomes.

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