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ORIGINAL ARTICLE

Treatment of Adolescent Tibia Vara with Guided Growth Using 8-Plate

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ABSTRACT

Background: Adolescent tibia vara, also known as adolescent Blounts disease, is a progressive deformity of the proximal tibia leading to genu varum. Surgical correction is often required in moderate to severe cases. Guided growth using a tension band plate (8-plate) has emerged as a less invasive alternative to osteotomy, with fewer complications and good outcomes in selected patients. This study aimed to evaluate the outcomes of treating adolescent tibia vara using guided growth with the 8-plate system.

Methods: This prospective study included 24 patients (40 limbs) with adolescent tibia vara treated at Zagazig University Hospitals from August 2023 to March 2025. The radiological evaluation included lateral distal femoral angle (mLDFA), medial proximal tibial angle (MPTA), joint line convergence angle (JLCA), and mechanical axis deviation (MAD). The average duration of patient follow-up was one and a half years.

Results: A significant improvement was observed in all clinical and radiological parameters. Intercondylar distance decreased by 52.89%, and MAD improved by 90.54% (right) and 89.12% (left). MPTA significantly increased, and JLCA and mLDFA decreased significantly. The average duration of plate application was 19.17 months. Full range of motion was preserved in all limbs. Complications occurred in 9 cases (37.5%), including undercorrection (7 limbs), screw breakage (3 limbs), and superficial wound infection (2 cases). Overall correction was achieved in 70.8% of the limbs.

Conclusion: Guided growth using 8-plate is an effective for correcting adolescent tibia vara in properly selected patients. It allows for gradual correction while preserving joint motion and minimizing complications.

Keywords: Adolescent tibia vara; Blount disease; Guided growth; 8-Plate

INTRODUCTION

Adolescent tibia vara, also known as adolescent Blount disease, is a gradual proximal tibial deformity that causes genu varum, which is defined by a medial displacement of the knee's mechanical axis. It typically manifests after the age of ten and is usually unilateral in presentation [1,2].

Based on the age at which the deformity first appears, Blount disease is divided into two clinical types: infantile (early-onset) and adolescent (late-onset). Compared to the infantile type, the adolescent form is more commonly seen in obese male patients, tends to be unilateral, and generally presents with a varus deformity of less than 30 degrees [2,3].

The exact etiology of adolescent tibia vara remains unclear, However, the posterior and medial portions of the proximal tibia are thought to be affected by this multifactorial developmental disease. Due in part to mechanical overload in genetically susceptible individuals, this causes varus and procurvatum abnormalities. Excessive biomechanical forces on the medial proximal tibia may

induce physeal injury according to the Heuter-Volkmann principle, leading to asymmetric medial physeal growth inhibition and subsequent pathologic varus deformity [2].
Diagnosis is based on a combination of clinical and radiographic findings. Clinically, patients present with outward bowing of the knees and increased intercondylar distance. Narrowing of the proximal tibial epiphysis and broadening or lucency of the medial proximal tibial physis are radiographic characteristics. The deformity is three-dimensional and may involve procurvatum and internal tibial torsion, even though genu varum is the main and first characteristic. In some cases, associated distal femoral varus may be present, which can exacerbate overall varus alignment. Studies have shown that adolescent Blount patients often have a greater degree of distal femoral varus, as measured by the anatomic lateral distal femoral angle (aLDFA), compared to unaffected individuals [2,3].

Surgical intervention is typically required for treatment and may involve corrective osteotomy, with or without external fixation, or hemiepiphysiodesis using either permanent or temporary methods. However, corrective osteotomies are associated with several complications, including superficial or deep infections, compartment syndrome, risk of deep vein thrombosis, physeal injury, neurovascular damage, knee stiffness, delayed or non-union, iatrogenic fractures, and potential loss of correction. Revision surgery may be necessary if osteotomy fails to heal properly [4].
Guided growth is a less invasive alternative and can be performed using permanent staples or temporary tension band plates (TBP), such as the 8-plate system. Since its introduction by Stevens in 2007, It has been demonstrated that the 8-plate is a safe and efficient technique for correcting pediatric angular deformities. It has largely replaced staples and osteotomies due to its simplicity, low complication rate, and minimal invasiveness [5,6].
Despite its advantages, guided growth using tension band plating has limitations. It is contraindicated after physeal closure, limiting its use to skeletally immature patients. Other complications may include over- or under-correction, screw loosening, and plate fracture [4].
If left untreated, adolescent tibia vara may lead to progressive knee arthritis and chronic pain in the knees, feet, ankles, and hips due to abnormal mechanical stress. Therefore, early correction can significantly improve knee mechanics, enhance gait, reduce pain, and prevent rapid progression of joint damage [7].

Hypothesis

The working hypothesis is that guided growth using the 8-plate system will lead to improved clinical and radiological outcomes in the treatment of adolescent tibia vara.

Aim of the work

To evaluate the outcomes of treating adolescent tibia vara using guided growth with the 8-plate system .

METHOD

Twenty-four individuals with juvenile Blount's disease (a total of forty afflicted limbs) participated in this prospective clinical trial. From August 2023 to March 2025, Zagazig University Hospitals used the eight-plate tension band technology to treat the patients with directed growth. Patients ranged in age from 10 to 15 years, with an average of 12.5 years at the time of surgery. The duration of the follow-up was six months to two years. The Research Ethics Committee of Zagazig University's Faculty of Medicine examined and approved the study (IRB #11296-26/11-2023). Prior to participation, written informed consent was obtained from each patient and/or their legal guardian. The study was carried out in compliance with the World Medical Association's accepted Declaration of Helsinki's ethical guidelines for research involving human beings.

Sample size

The sample size was determined based on the assumption that all eligible cases meeting the inclusion and exclusion criteria would be enrolled during the designated study period. With an expected admission rate of approximately four cases per month over a six-month duration, a total of 24 patients were included in the study as a comprehensive sample.

Eligible patients met specific inclusion criteria. These included being over 10 years of age at the time of diagnosis, with sufficient growth potential (defined as more than 12 months of remaining growth). The assessment of physeal activity was based on the width of the physis at the femoral and tibial ends, and when uncertain, additional evaluation was performed using wrist radiographs to assess skeletal maturity. Only idiopathic deformities were considered for inclusion, and cases were limited to mild-to-moderate deformities corresponding to Zone 3 as described by Stevens. Furthermore, patients were required to have a tibiofemoral angular deformity greater than 10 degrees and a body mass index (BMI) of less than 40. Patients were excluded if they had any untreated metabolic disorders affecting epiphyseal growth, post-traumatic deformities involving the growth plate, or underlying skeletal dysplasia.

Out of the 24 patients that were part of the study, 5 were female (20.8%) and 19 were male (79.2%). 12.47 ± 1.48 years was the average age. The population under study had a mean BMI of 31.5 ± 4.52 kg/m², with a range of 24 to 38 kg/m². Sixteen patients (66.7%) presented with bilateral deformities, while eight patients (33.3%) had unilateral deformity, making a total of 40 affected limbs.

Regarding the anatomical site of intervention, the lateral proximal tibia (LPT) was the most frequently targeted area, with plates applied in 40 limbs. In addition, the lateral distal femur (LDF) was addressed in 21 limbs. The total number of eight-plates used throughout the study was 61, as some limbs required more than one plate, depending on the severity and multi-planar nature of the deformity.

Preoperative assessment

Every patient received a comprehensive preoperative evaluation that comprised a physical examination, a history taking, and a local examination of the knee joint. This included measuring the intercondylar distance and evaluating the patellar stability, range of motion, ligamentous laxity, and tibial torsion. A complete blood count (CBC), coagulation profile, liver and kidney function tests, and metabolic bone profile were all part of the standard laboratory workup. The latter comprised measures of parathyroid hormone (PTH), blood phosphorus, serum total and ionized calcium, alkaline phosphatase levels, and 25-hydroxyvitamin D [25(OH)D].

Radiological evaluation was essential for deformity analysis. Standard anteroposterior (AP) and lateral X-ray views of both knees were obtained, in addition to standing full-length weight-bearing AP radiographs of both lower limbs in neutral rotation (scanogram). Several radiographic indices were measured, comprising the mechanical lateral distal femoral angle (mLDFA), the mechanical medial proximal tibial angle (mMPTA), the joint line convergence angle (JLCA) of the knee joint, and the mechanical axis of the entire lower limb and its deviation. By using these measurements, it was possible to ascertain if the abnormality involved the tibia and femur or if it started with the tibia alone.

Operative procedure

Every procedure was carried out under tourniquet control and either spinal or general anesthesia. To make intraoperative imaging easier, patients were placed supine on a radiolucent operating table. The targeted physis was first localized under fluoroscopic guidance in both the anteroposterior and lateral planes using an image intensifier. Once localization was confirmed, a vertical skin incision was made over the planned site. Dissection proceeded through successive layers, which were longitudinally split until the periosteum was reached; care was taken to preserve the periosteum intact (Figure 1A).

Under fluoroscopic guidance, a guide wire was carefully inserted across the physis, ensuring central placement without rapid drilling, which was preferably done manually to minimize thermal injury (Figure 1B). The appropriate size of the eight-Plate was then selected small, medium, or large titanium plates based on the patient's age, bone size, and growth plate dimensions. To guarantee proper alignment, the plate was centered and perpendicular to the physis in both views after being installed over the guide wire and adjusted under fluoroscopy (Figure 1C).

Using a drill, and again under fluoroscopic control, a 1.5-mm epiphyseal guide wire was inserted through the upper hole of the plate, followed by placement of a metaphyseal guide wire in the lower hole. The wires were advanced to a depth corresponding to the intended screw length and kept as parallel as possible to avoid crossing the physis or penetrating the joint space. A 3.2-mm cannulated drill bit was then used to ream the outer cortex to a depth of 5 mm over each guide wire, starting with the epiphyseal hole, followed by the metaphyseal hole.

Following drilling, the epiphyseal guide wire was removed, and a cannulated screw was inserted into the epiphysis, advanced approximately halfway (Figure 1D). The metaphyseal wire was then removed, and its corresponding screw was similarly advanced halfway. Prior to final screw tightening, the surrounding soft tissues were carefully inspected to ensure that no fascia were entrapped beneath the plate. Both screws were then alternately advanced until they were fully seated in the plate, maintaining parallelism relative to the physis (Figure 1E).

After confirming proper positioning and fixation, hemostasis was secured. The surgical wound was closed in layers using absorbable sutures, and skin closure was completed in a standard manner. A light compressive dressing was applied over the incision site (Figure 1F).

Postoperative management

Postoperatively, patients were either discharged on the same day or kept overnight for pain management and observation, depending on clinical need and social considerations. Crutches were offered on an optional basis and typically used for three to seven days postoperatively. Patients were allowed to progressively resume activities as tolerated. Physical therapy was not routinely prescribed, but was recommended if the child experienced difficulty bending the knee during the initial follow-up visit, which occurred between 7 and 14 days post-surgery. Knee stiffness requiring therapy was more commonly observed following femoral plate placement due to potential postoperative hemarthrosis. Full return to unrestricted physical activity, including contact sports, was permitted after four weeks post-surgery, assuming satisfactory clinical and radiographic progression.

Follow-up protocol

Postoperative follow-up was conducted both clinically and radiologically to monitor the progression of deformity correction. Patients were assessed monthly to monitor functional recovery.

Radiographic evaluation was performed three months after surgery using standing full-length weight-bearing anteroposterior radiographs of both lower limbs in neutral rotation (scanogram).

The joint line convergence angle (JLCA), mechanical axis deviation (MAD), mechanical lateral distal femoral angle (mLDFA), and medial proximal tibial angle (MPTA) were among the important indicators measured during radiological investigation. Over time, the degree of deformity repair was evaluated using these measures. The eight-plate's screws gradually pivot or diverge as the growth plate reacts to directed growth, indicating physeal modulation. (Figure 1G). Follow-up erect limb radiographs were used to quantify the changes in joint orientation and mechanical alignment, including the Mikulicz line, which represents the overall mechanical axis of the lower limb.

In certain cases, slight overcorrection of the Mikulicz line was deliberately planned before implant removal. This involves allowing the mechanical axis to pass 1 to 2 cm lateral to the center of the knee, particularly in patients with late-onset tibia vara and significant remaining growth potential. Overcorrection serves as a preventive measure against rebound deformity, which may occur after removal of the implant. This approach is especially recommended when residual growth exceeds one year.

Removal of the eight-Plate was performed under either general or spinal anesthesia and with the use of a pneumatic tourniquet. The previous surgical scar was sharply incised, and scar tissue could be excised if necessary. In the majority of cases, the eight-Plate was easily located after dissection through the subcutaneous and deep tissue layers. However, the use of an image intensifier was recommended during the procedure to assist in plate localization if any difficulty was encountered (Figure 1H).

Throughout the removal process, meticulous care was taken to preserve the periosteum and the perichondrial ring, in order to minimize the risk of physeal bar formation, which could potentially impair future growth. Patients were typically allowed to resume full physical activity, including contact sports, within four weeks following removal of the implant, assuming normal recovery and radiographic stability.

Statistical analysis

Armonk, New York, USA. Qualitative data were displayed as frequencies and percentages, whilst quantitative data were provided as mean ± standard deviation (SD) and range. The paired t-test was performed to compare continuous variables with normally distributed data before and after surgery. The Wilcoxon signed-rank test was used for data that was not regularly distributed. The data distribution's normality was evaluated using the Shapiro-Wilk test. P-values below 0.05 were regarded as statistically significant.

RESULTS

Assessment was done using intercondylar distance (ICD) for genu varum deformity. This table shows that there was a statistical significance decrease in ICD score post operative compare to pre with reduction of 52.89% for ICD. (Table 1)

Radiographic correction was evaluated through several angles and distances, including mechanical axis deviation (MAD), mechanical lateral distal femoral angle (mLDFA), mechanical medial proximal tibial angle (mMPTA), and joint line convergence angle (JLCA).

There was a statistical significance decrease in Mechanical Axis Deviation (MAD) score post operative compare to pre in both sides with % of reduction 90.54% and 89.12% in Rt and Lt side respectively (Table 2).

Table 3; showed that there was a statistical significance decrease in JLCA score post operative compare to pre in both sides with % of reduction 82.68% and 81.1% in Rt and Lt side respectively.

Table 4; showed that there was a significant reduction in Mechanical Lateral Distal Femoral Angle (mLDFA) after surgery on both sides. The right side improved by 2.6% and the left by 3.6%. Unlike the other indices, mMPTA values increased significantly, indicating correction of the tibial component of the deformity. The right side improved by 5.4% and the left by 8.2%.

The duration of implant application ranged from 13 to 25 months, with a mean of 19.17±3.75 months, as shown in Table 5.

A total of 9 patients (37.5%) experienced complications in the form of under correction and superficial wound infection which was managed by repeated dressing until complete healing. Under-correction was the most frequent issue, occurring in 7 patients (29.2%), including 3 cases due to screw breakage. Superficial wound infections were observed in 2 cases (8.3%) and managed conservatively with local wound care (Table 6). At final follow-up, 70.8% of limbs achieved complete deformity correction, while 29.2% remained under-corrected. No cases of overcorrection or rebound deformity were recorded (Table 6).

Case presentation

When he was 12 years old, a 14-year-old boy first developed bilateral adolescent tibia vara. with no history of trauma or metabolic disorder. Preoperative assessment revealed an intercondylar distance of 6 cm, normal knee range of motion, and a body mass index (BMI) of 32 kg/m². Preoperative radiographs (Figure 2A) showed, on the right knee: JLCA 2.5°, MAD 13.1 mm (zone 2−, mild deformity), mLDFA 90°, and mMPTA 84.1°; and on the left knee: JLCA 7.2°, MAD 54.4 mm (outside zone 3−, severe deformity), mLDFA 98.3°, and mMPTA 82.1°. The patient underwent guided growth using an 8-plate applied to the left lateral distal femoral physis and the lateral proximal tibial physis bilaterally. At the 22-month follow-up, complete clinical correction was achieved with an intercondylar distance of 0 cm and preserved full range of motion. Postoperative radiographs (Figure 2B) demonstrated, on the right knee: JLCA 1.5°, MAD 2 mm (zone 1+, within normal limits), mLDFA 88°, and mMPTA 87.5°; and on the left knee: JLCA 1.1°, MAD 0 mm (mechanical axis bisecting the knee), mLDFA 87.3°, and mMPTA 86°. This case highlights successful correction of bilateral deformity, including a severe varus knee, using the guided growth technique with 8-plates, resulting in normalization of the mechanical axis and restoration of function without complications.

Table 1: Intercondylar Distance (ICD) Preoperative and Postoperative

Variable	Preoperative (n=24)	Postoperative (n=24)	Paired W	P	% of reduction
ICD: **Mean±Sd** **Median** **Range**	6.83±1.54 7 4.5 - 10	4.45±1.25 5 3-7	4.29	0.000178	52.89%

SD: Standard deviation W: Paired Wilcoxon test *: Significant (P<0.05)

Table 2: MAD (cm) Score of the studied cases pre & post operative

Variable	Pre (N=24)	Post (N=24)	Paired W	P	% of reduction
Right: **Mean±Sd** **Median** **Range**	3.44± 2.36 3.2 0.2-8.12	1.8±2.07 1.25 0.2-6	2.69	0.007	90.54%
Left: **Mean±Sd** **Median** **Range**	4.38±2.18 3.7 0.3 – 8.42	2.35±1.8 2 0.3-5.9	2.63	0.008	89.12%

SD: Standard deviation W: Paired Wilcoxon test *: Significant (P<0.05)

Table 3: Joint Line Convergence Angle (JLCA) Score of the studied cases pre & post operative

Variable		Pre (N=18)	Post (N=18)	Paired W	P	% of reduction
Right	Mean ± Sd Median Range	3.54 ± 2.78 3.9 0–8.6	0.75 ± 1.66 0 0–6	3.60	< 0.001 **	82.68%
Left	Mean ± Sd Median Range	4.07 ± 2.81 3.8 0–11	0.99 ± 1.71 0 0–6	3.30	0.001 *	81.1%

SD: Standard deviation W: Paired Wilcoxon test *: Significant (P<0.05)
**: Highly significant (<0.001)

Table 4: mLDFA and MPTA Score of the studied cases pre & post operative

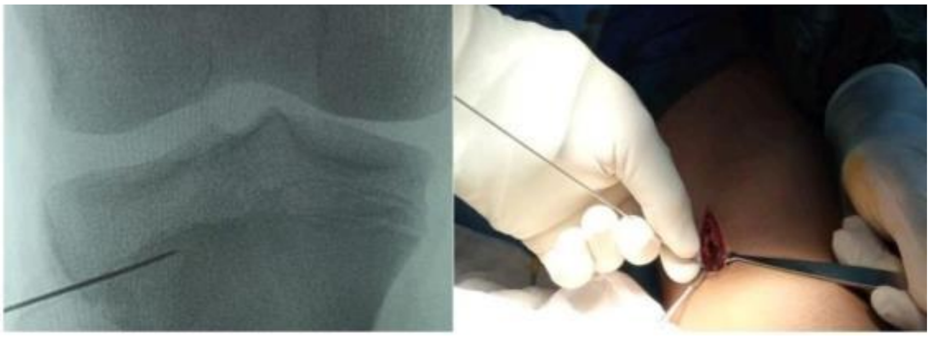
Variable		Pre (N=24)	Post (N=24)	Paired t	P	% of decrease
mLDFA	**Right** Mean±Sd Range	91.9±4.3 84°-98°	89.3±2.1 84°-91°	2.31	0.02	2.6%
	Left Mean±Sd Range	93±3.75 86.5-99°	89.4±1.96 86°-93°	3.64	0.002	3.6%
MPTA	**Right** Mean±Sd Range	79.7±3.96 73°-86°	85.1±1.7 81°-87°	4.09	0.0004	5.4%
	Left Mean±Sd Range	78.1±4.6 70°-86°	86.3±1.8 84°-90°	4.1	0.0004	8.2%

SD: Standard deviation t: Paired t test *: Significant (P<0.05) **: Highly significant (<0.001)

Table 5: Duration of 8-Plate Application

Variable		**N=24**
Duration of 8 plate application (months)	Mean ± Sd Median Range	19.17 ± 3.75 18.5 13-25

A



B

C

D

E

F

G

H

Figure (1): (**A**)Vertical skin incision. (**B**) Under fluoroscopic guidance, insertion of the guide wire in the growth plate. (**C)** The 8-Plate was applied over the wire to determine the size of plate. (**D)** Insertions of screws guide wires parallel to the physis then canulated screw placement in the epiphyseal hole. (**E)** After drilling, screws are inserted parallel to the physis. (**F)** Skin closure and absorbable suture are used to close the incision in layers. (**G)** An eight-plate showing how the screws in the plate change position in reaction to the expansion of the physeal tissue. **(H)** 8-plate removal.

Figure (2A): Pre-operative standing full length AP radiographs of both lower limbs in neutral rotation (scanogram) and pre-operative clinical photo.

Figure (2B): Standing full length AP radiographs of both lower limbs in neutral rotation (scanogram) and clinical photo after 22 months of follow up.

DISCUSSION

In this prospective study, which included 40 limbs in 24 patients with adolescent tibia Vara, Aged Between 10 And 15 Years (Mean Age: 12.5 Years), The Rate Of Correction Was Found to be influenced by the age of the patient. There was a clear inverse relationship between age and speed of correction, whereby older patients demonstrated slower rates of deformity correction. This finding is consistent with the general understanding that growth modulation techniques, such as guided growth using 8-plates, rely on residual growth potential, which diminishes with age.

Waleed et al. A study on 18 patients (12 boys and 6 girls) with angular knee deformities treated with guided growth using 8-plates, the mean age of the cases at the time of the operation was 6.5 years (range, 4–11 years), All patients achieved complete deformity correction after plate removal [8].

Elzohairy, 17 patients with tibia vara underwent corrections of deformity associated with tibia vara by modified Rab proximal tibial oblique osteotomy, In twelve patients the deformity was bilateral and it was unilateral in the other five patients, with a total of 29 tibiae. They were ten boys and seven girls with a mean age at surgery of 3 years 6 months (range, 3 years 2 months to 4 years 11 months) [9].

In this study, 24 patients (40 limbs) were operated 7 of them failed, Body weight of patients was ranging from 33 kg to 88 kg with mean of 59.4k, six patients from failure group (total 7 patients) were obese with BMI >35.

Waleed et al. In series of 18 patients, there was no relation between sex of the patient and rate of correction [8].

Elzohairy , in series of 17 patients there was no relation between sex of the patient and rate of correction [9].

In this study which included 40 limbs in 24 patients, 19 patients were males and 5 patients were females, there was no relation between sex of the patient and rate of correction.

Waleed et al. Neutral mechanical axis with no MAD was the sign of complete correction. Alignment improved in all cases at final follow up [8].

The mechanical axis in this study traveled medially to the knee center at a mean of 43 mm (range: 2 to 84.2 mm) prior to surgery. At the time of the most recent follow-up, the mean mechanical axis deviation had improved to 20 mm (range: 3 to 60 mm).

Waleed et al. At the time of the most recent follow-up, the mean medial proximal tibial angle (normal, 87° with a range of 85° to 89°) had the average MPTA increased from 77°.3±3.1 to 85°.4±4.8 significantly (P=0.00**) which constitute an average change of 8° [8].

During the last follow-up in this study , the mean medial proximal tibial angle for the right limb in this study improved from 79.7° (range: 73° to 86°) preoperatively to 85.1° (range: 83° to 87°). Meanwhile, the mean medial proximal tibial angle for the left limb improved from 78.3° (range: 70° to 86°) preoperatively to 86.3° (range: 84° to 90°).

Waleed et al. the average of mLDFA decreased from 98.4°±4.6 to 87.4°±2.3 significantly (P=0.003*), which constitutes an average change of 11° [8].

In this research, according to the study, the right side's mean lateral distal femoral angle (normal, 88° with a range of 86° to 89°) was 91.9° (range, 84° to 98°) prior to surgery. This improved to 89.3° (range, 84° to 91°).

The left side's mean lateral distal femoral angle before to surgery was 93° (range: 86.3° to 99°), which is typical at 88° with a range of 86° to 89°. With a range of 86° to 93°, the mean lateral distal femoral angle improved to 89.4°.

Waleed et al. No intraoperative complicationswere recorded. Postoperative superficial infections were reported in two cases (11.1%) and treated by repeated dressing and IV cephalosporin antibiotics for 10 days. Wound dehiscence, reactive synovitis, or hardware failures, were not observed in this series. No cases required any osteotomy or repeat the eight-Plate insertion until final follow up [8].

Park et al. A common peroneal nerve neuropraxia was observed in one patient, most likely as a result of severe retraction during surgery. Three months after surgery, it went away on its own. There were no early problems or wound infections [10].

Elzohairy 100% of the patients in this study had a good result. There were no transient or permanent nerve palsies or deep infection and no instances of compartment syndrome. All patients regained their preoperative knee and ankle motion. No patients complained of knee pain at follow-up [9].

In this study, 24 patients (40 limbs) were included, 7 patients were Uncorrected (three of them failed due to screw breakage) and 2 patients had superficial wound infection early postoperatively and improved with parenteral antibiotics.

CONCLUSION

Guided growth using 8-plate is an effective, minimally invasive method for correcting adolescent tibia vara in properly selected patients. It allows for gradual correction while preserving joint motion and minimizing complications. However, the technique is less effective in older or obese patients and requires careful follow-up to manage potential undercorrection.

Study limitations

Our study has some limitations. First, we did not have a large number of patients. Second, Short term follow up of patients after removal of eight plates.

Conflict of Interest: None

Financial Disclosures: None.

Availability of the data: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors contribution: The authors were responsible for data collection and analysis, as well as writing and preparing the manuscript for publication. All authors reviewed and approved the final version.

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Table S1: Complications and Outcome among the studied cases

Variable		N=24	
		No	**%**
Complications	**No**	15	62.5%
	Superficial wound infection	2	8.3%
	Under correction	7	29.2%
Outcome	**Corrected**	17	70.8
	Uncorrected	7	29.2

Citation

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