

## Surgical Resection of Haglund's Deformity by Achilles Tendon Splitting Approach

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### Abstract

**Background:** Haglund's deformity was first described by Patrick Haglund in 1927 [1]. It is also known as retro-calcaneal exostosis. It is one of the causes of posterior heel pain. Several methods have been described for treatment including conservative measures and surgical measures.

**Aim of Study:** The aim of this study is to evaluate results of surgical resection of Haglund's deformity by Achilles tendon splitting approach.

**Patients and Methods:** In this prospective study, 21 cases with were Haglund's deformity treated with surgical resection through Achilles tendon splitting approach.

**Results:** These cases were assessed according to AOFAS score [2], the functional results were graded as excellent in twelve patients (57.1%), good in eight patients (38.1%), fair in one patient (4.8%), with no poor results. The excellent and good results were considered as satisfactory ones while the unsatisfactory included the fair results. Thus, satisfactory results were found in 20 patients (95.2%), and the unsatisfactory ones were found in 1 patient (4.8%).

**Conclusion:** This study proves that central splitting technique for the surgical treatment of Haglund's deformity is an effective treatment with good exposure of retrocalcaneal space, with decrease risk of vascular and nerve injury, and acceptable outcome.

**Key Words:** Haglund's deformity – Achilles tendon – Splitting approach.

### Introduction

**HAGLUND'S** deformity was first described by Patrick Haglund in 1927 [1]. It is also known as retro-calcaneal exostosis. It has no definitive etiology, but various probable causes like a tight Achilles tendon, a high arch of the foot, and heredity factors have been suggested. It is characterized by pain in the back of the heel which is more

after rest. Pain could be due to associated Achilles tendonitis and retro-calcaneal bursitis [1,3,4].

It occurs in both genders with female predominance, and usually affects young patients, particularly at age 30s and 40s [5].

Diagnosis of Haglund's deformity is based on history, clinical findings, and radiographic changes. In a lateral radiograph, a bony prominence at the postero-superior part of the calcaneal tuberosity is seen in these patients, and may be associated with a calcaneal spur and heterotopic bone formation at the insertion of the Achilles tendon [6-8].

A Magnetic Resonance Imaging (MRI) scan shows postero-superior calcaneal spurring with impingement on the Achilles tendon, and may be associated with synovial thickening and collection of fluid in the retro-calcaneal bursa with thickening of the insertional fibers of Achilles tendon and edema in the adjoining retro-Achilles fat pad [9].

Conservative measures include reassessment of the shoe of the patient and heel pads. Casting may be used for pain reduction and an ice bag to decrease swelling. Anti-inflammatory drugs, stretching exercises, and physiotherapy may relieve tension from the Achilles tendon. If conservative treatment is not effective surgical treatment options are used [10-13].

There are numerous surgical options available for excision of bony prominence with or without Achilles tendon debridement and excision of the retro-calcaneal bursa [14-16].

### Patients and Methods

#### A- Patients:

This study included 21 patients (13 males, 8 females and their ages range from 32 years to 56

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years with an average of 42) treated between August 2017 and August 2018 (including follow-up period) at Tanta University Hospital by surgical resection through Achilles tendon splitting approach.

The period of follow-up ranged from six to 12 months with an average of 8.6 months.

*Clinical examination:*

*General examination:*

Blood pressure, pulse, temperature, respiration and other body systems.

*Local examination:*

**Tenderness:** At back of heel, swelling at back of heel, soft tissue condition and distal circulation and deformity.

The inclusion criteria were patient age from 20 to 60 years old, and failure of conservative treatment more than six months. While, the main exclusion criteria were patients older than 60 years old, patients with peripheral neurovascular diseases, and poor soft tissue and skin condition.

**B- Method:**

- Pre-operative I.V antibiotics (Ampicillin/ Sulbactam) were given 30min to one hour before surgery.
- The patient was placed in prone position with using of a tourniquet.
- An incision centered over the Achilles tendon, approximately 8cm proximal to the Achilles tendon insertion and extending distally to the glabrous skin Fig. (1).
- An incision was made directly down to the paratenon.
- A central tendon splitting approach was performed Fig. (2).
- The degenerative portion of the tendon was carefully excised, and tendon continuity was tested.
- Inflamed bursa and scarred or fibrosed fat were removed from above the retrocalcaneal space to define the Haglund's deformity Fig. (3).
- The bony prominence was completely excised using a hand osteotome in an oblique fashion from posterior to anterior Fig. (4).
- After smoothing of the margin, the final shape of the calcaneus was confirmed using a fluoroscopic image, Fig. (5).
- The tendon was augmented to the insertion with suture anchors Figs. (6,7).

- The paratenon was also repaired with absorbable suture, and the skin was closed with nonabsorbable suture.

- Blow knee cast in equines position for two weeks then another two weeks in neutral position.

*Post-operative management:*

- Patients were monitored for any clinical changes, and discharged home after a 48 hours with instructions.

- Subcutaneous enoxaparin (clexane) for five days then oral anticoagulant (Rivaroxaban) for nine days, may increase duration for high-risk patients.

- Patients were allowed to start partial weight bearing after four weeks, then full weight bearing after another four weeks.

- Immobilization for six weeks if greater than 50% of the tendon insertion is dissected or as augmentation procedure.

- Physiotherapy to regain gastrocnemius-soleus strength.

*Methods for assessment of the results:*

At six month follow-up at least, using the AO-FAS score (American Orthopedic foot and Ankle Society) [2] to evaluate and to score the functional outcome Fig. (8).



Fig. (1): Skin incision.



Fig. (2): A central tendon splitting approach was performed.



Fig. (3): Retro calcaneal bursa and fibrosed fat were removed.



Fig. (4): The bony prominence is excised with osteotome.



Fig. (5): Final shape of calcaneus.

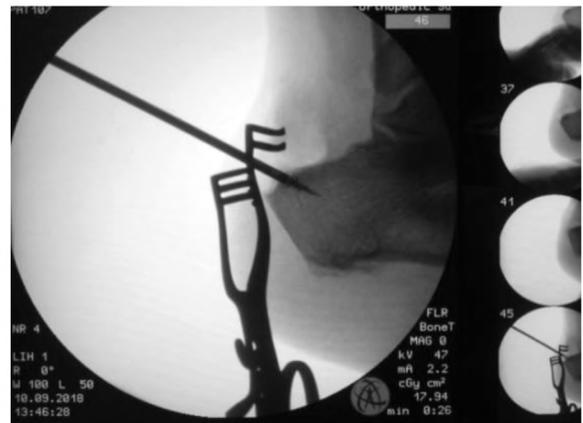


Fig. (6): The tendon is augmented to the insertion with suture anchors.



Fig. (7): Tendon repair.

Ankle-Hindfoot Scale (100 Points Total)
<b>Pain (40 points):</b>
None
Mild, occasional
Moderate, daily
Severe, almost always present
<b>Function (50 points):</b>
<i>Activity limitations, support requirement:</i>
No limitations, no support
No limitation of daily activities, limitation of recreational activities, no support
Limited daily and recreational activities, cane
Severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace
<i>Maximum walking distance, blocks:</i>
Greater than 6
4-6
1-3
Less than 1
<i>Walking surfaces:</i>
No difficulty on any surface
Some difficulty on uneven terrain, stairs, inclines, ladders
Severe difficulty on uneven terrain, stairs, inclines, ladders
<i>Gait abnormality:</i>
None, slight
Obvious
Marked
<i>Sagittal motion (flexion plus extension):</i>
Normal or mild restriction (30° or more)
Moderate restriction (15°-29°)
Severe restriction (less than 150)
<i>Hindfoot motion (inversion plus eversion):</i>
Normal or mild restriction (75%-100% normal)
Moderate restriction (25%-74% normal)
Marked restriction (less than 25% normal)
<i>Ankle-hindfoot stability (anteroposterior, varus-valgus):</i>
Stable
Definitely unstable
<i>Alignment (10 points):</i>
Good, plantigrade foot, midfoot well aligned
Fair, plantigrade foot, some degree of midfoot malalignment observed, no symptoms
Poor, nonplantigrade foot, severe malalignment, symptoms
Total = 1

Fig. (8): Ankle-hind foot scale [2].

**Results**

Follow-up period was ranged from six to twelve months with a mean of 8.6±1.2months. The patients were followed-up until complete improving and regaining normal ankle function.

**A- Clinical (functional) results:**

**1- AOFAS score:**

According to AOFAS score [2], the functional results were graded as excellent in twelve patients

(57.1%), good in eight patients (38.1%), fair in one patient (4.8%), with no poor results. The excellent and good results were considered as satisfactory ones while the unsatisfactory included the fair results. Thus, satisfactory results were found in 20 patients (95.2%), and the unsatisfactory ones were found in 1 patient (4.8%) (Table 1), Fig. (9).

The mean AOFAS scores pre-operatively improved from 56 to 89.5.

**2- Pain:**

The pain was assessed according to AOFAS questionnaire. 15 patients had no pain, five patients had mild (occasional) pain, and one patient had moderate (daily) pain (Table 2), Fig. (10).

**Factors affecting the final clinical score:**

Durations of symptoms before surgery was found to have statistically significant effect in the results  $p$ -value=0.01 ( $p < 0.05$  statistically significant) (Table 3).

- There were no significant correlation between age of the patients, sex, occupation and associated medical condition and final end results as  $p$ -value  $> 0.05$  statistically insignificant.

**Complications:**

Complications were found in two patients (9.5%) of this study.

In this study, two case developed superficial wound infection. One of them was diabetic and other one was non diabetic. Culture and sensitivity was done and the appropriate intra-venous antibiotic was given for ten days and the case showed improvement within two weeks without need for debridement.

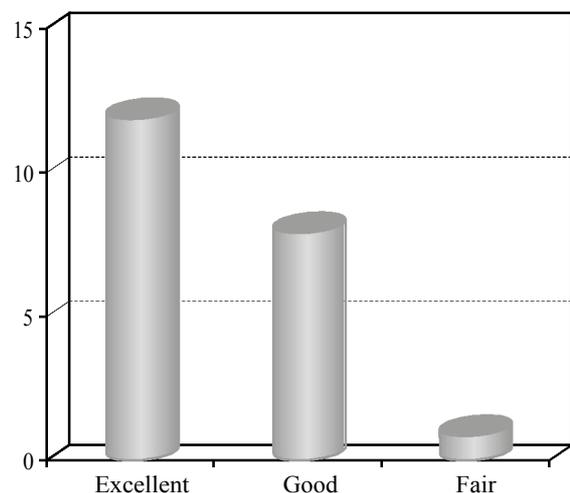


Fig. (9): Functional end results.

Table (1): Final results.

Satisfactory			Unsatisfactory		
Excellent	Good	Total	Fair	Poor	Total
12	8	20	1	0	1
57.1%	38.1%	95.2%	4.8%	0	4.8%

Table (2): Pain severity incidence.

Pain	N	%
No	15	71.4
Mild	5	23.8
Moderate	1	4.8

Table (3): Effect of duration of symptoms before surgery and functional end results.

	6-12m	13-24m	>24m	Total
Excellent	10	2	0	12
Good	1	7	0	8
Fair	0	0	1	1
Total	11	9	1	21

### Discussion

Haglund deformity is described as a prominence of the postero superior part of the calcaneus. It is one of the common causes of posterior heel pain [13].

The goal of treatment of Haglund deformity is removing the calcaneal prominence and the inflamed surrounding soft tissues [15].

The optimal treatment of Haglund deformity remains controversial, despite the variety of treatment options which have been suggested for this deformity, including conservative treatment, surgical resection of Haglund deformity either open or arthroscopic. Open procedures are advantageous as they provide an appropriate exposure and allow adequate removal of inflamed tissues and calcaneal prominence; however they are associated with skin and wound problems. Minimally invasive techniques have become popular as they overcome this problem but often result in inadequate removal [17,18].

Several different approaches have been used for the surgical treatment of Haglund's deformity. Each of them has some advantages and some limitations as well.

This study included 21 patients with Haglund deformity they were treated during the period between August 2017 to August 2018 at Tanta

University Hospital with surgical resection through Achilles tendon splitting approach.

These cases were assessed according to AOFAS (American Orthopedic foot and Ankle Society), scoring system [2]. Clinical results were graded as excellent, good, fair, or poor as follow:

Twelve patients (57.1%) had excellent results, eight patients (38.1%) had good results and one patient (4.8%) had fair result with no poor results. The excellent and good results were considered as satisfactory and the unsatisfactory ones included the fair results. Thus satisfactory results were found in 20 patients (95.2%), and the unsatisfactory ones were found in 1 patient (4.8%). In our study, the period of follow-up ranged from 6 to 12 months with an average of 8.6 months.

The results were nearly matched with that achieved by Nunley JA et al., [19], they treated 27 patients with 29 surgical procedures (two patients had bilateral surgery). AOFAS hind foot scores were good to excellent in 96% of the patients.

The results in this study were better than those achieved by Xia Z et al., [20], they treated 22 patients (22 heels) through tendon splitting approach with a mean age of 59.2±7.3 years and a mean follow-up duration of 15.1±4.6 months. Satisfaction rate was 77.3% of patients.

The results in this study were better than those achieved by McGarvey et al., [21]. They treated 22 heels in 21 patients through tendon splitting approach with a mean age of 54.4 years (30 to 77 years) and a mean follow-up duration of 33 months. Satisfaction rate was 82% of patients.

In this study the AOFAS score improved from a mean of 56 points pre-operatively to 89.5 points post-operatively. These results nearly matched with that achieved by Johnson et al., [22], they treated 22 patients. The AOFAS score improved from a mean of 53 points pre-operatively to 89 points post-operatively.

Comparing with surgical resection of Haglund deformity through lateral approach, the satisfactory results in this study were better than those achieved by Sella et al., [11]. They treated 13 patients (16 heels) their results after 42 months follow-up period were 13 good result (81.25%) and 3 poor results (18.75%).

The results in this study were nearly matched with that achieved by Sammarco et al., [18], they treated 39 heels with Haglund deformity through medial approach. The results were 50% excellent,

47% good results, and 3% fair with a mean follow-up duration of three years.

The results were nearly matched with that achieved by Ortmann et al., [23], they treated 30 patients (32 heels, two bilateral) through endoscopic bony and soft-tissue decompression of the retrocalcaneal space with a mean age of 51 years (range 22 to 75 years), and a mean follow-up duration of 35 months (range 3 to 62 months). According to AOFAS there were 26 patients (86.7%) had excellent results, three patients (10%) had good results and one patient (3.3%) had poor result.

In this study the results were better than that achieved by Leitze et al., [24], they treated 33 patients with a mean age of 49 years (range, 19 to 79 years), through endoscopic decompression of the retrocalcaneal space. AOFAS improved from a mean of 61.8 points pre-operatively to 87.5 points post-operatively. Twenty four patients (80%) had satisfactory results [19 patients (63.3%) excellent, five patients (16.7%) good], and six patients (20%) had unsatisfactory results [three patients (10%) fair, and three patients (10%) poor], with a mean follow-up period of 22 months. There were three patients were excluded from the study.

In this study, the pain was assessed according to AOFAS questionnaire, 15 patients (71.4%) had no pain, five (23.8%) patients had mild (occasional) pain, and one patient (4.8%) had moderate (daily) pain. These results were lower than that achieved by Nunley et al., [19]; they reported that 96% pain-free patients. In this study, the lower results regarding the pain could be due to short follow-up period.

Also comparing with the study achieved by McGarvey et al., [21], the results were 13 (59.1%) patients had no residual pain, three (13.6%) patients described no change and only slight alteration from pre-operative pain, two (9.1 %) patients actually felt worse after surgery and four (18.2%) described pain in the same area, but assuming a less severe character.

In this study, age was found to have statistically insignificant effect on the end results. This with the study done by Johnson et al., [22] who reported that no significant correlation between the age of the patient and the final end result.  $p$ -value=0.35 ( $p > 0.05$  statistically insignificant), and this against the study done by McGarvey et al., [21] who reported that patients over the age of 50 had poor results with the central splitting surgical techniques.

In this study, associated medical condition, sex and occupation were found to have statistically insignificant effect on the final end results.

Was found to have duration of symptoms before surgery statistically significant effect on the final results, as the highest excellent results were found in patients who complaining from symptoms 6-12 months before surgery and unsatisfactory results were found in patients complaining more than 24 months before surgery, it may be due to pre-existing degenerative changes in the tendon. This with the study done by Watson et al., [12], who reported that found to have statistically durations of symptoms before surgery was significant effect on final results.

In this study two cases developed superficial wound infection. One of them was diabetic. Culture and sensitivity were done and the appropriate antibiotic was given, and the cases showed improvement within 2 weeks without need for debridement.

Sammarco et al., [18], reported that one patient of 39 patients who were treated through medial approach had superficial wound infection that was successfully treated with antibiotics, McGarvey et al., [21], also reported one patient of 22 patients who were treated through tendon splitting approach had superficial infection that were resolved with oral antibiotics, Johnson et al., [22], also reported two patients of 22 patients had superficial partial wound dehiscence that were resolved with dressing and did not require reoperation.

In this study there were no major complications as avulsion of the Achilles tendon. Comparing to the study done by Ortmann et al., [23], they reported one patient of 30 patients who were treated through endoscopic bony and soft tissue decompression of the retrocalcaneal space had Achilles tendon rupture three weeks after surgery.

## References

- 1- LAWRENCE D.A., ROLEN M.F., MORSHED K.A., et al.: MRI of heel pain. *Am. J. Roentgenol.*, 200; 845-55, 2013.
- 2- SOOHOO N.F., VYAS R. and SAMINI D.: Responsiveness of the foot function index, AOFAS clinical rating systems, and SF-36 after foot and ankle surgery. *Foot & ankle international.*, 27 (11): 930-4, 2006.
- 3- A. SIERRA-SOLÍS, A.I. ROMERO-LÓPEZ, J.L. MARTÍN-RODRIGOSEMERGEN, et al.: Haglund's syndrome. Two case reports. *Rheumatol. Clin.*, 38: 64-5, 2012.
- 4- KUCUKSEN S., KARAHAN A.Y. and EROL K.: Haglund syndrome with pump bump. *Med. Arch.*, 66: 425-7, 2012.
- 5- VAN AMAN S. and COOPER M.T.: Haglund's deformity (pump bump). In: Miller MD, Hart JA, Macknight JM, eds. *Essential Orthopedics*. Philadelphia: Saunders, 755-7, 2010.

- 6- PAVLOV H., HENEGHAN M.A., HERSH A., et al.: The Haglund syndrome: Initial and differential diagnosis. *Radiology*, 144: 83-8, 1982.
- 7- LU C.C., CHENG Y.M., FU Y.C., et al.: Angle analysis of Haglund syndrome and its relationship with osseous variations and Achilles tendon calcification. *Foot Ankle Int.*, 28: 181-5, 2007.
- 8- SINGH R., ROHILLA R., SIWACH R.C., et al.: Diagnosis significance of radiologic measurements in posterior heel pain. *Foot*, 18: 91-8, 2008.
- 9- LAWRENCE D.A., ROLEN M.F. and MORSHED K.A.: MRI of heel pain. *A.J.R. Am. J. Roentgenol.*, 200: 845-55, 2013.
- 10- STEPHENS M.M.: Haglund's deformity and retrocalcaneal bursitis. *Orthop. Clin. North Am.*, 25: 41-6, 1994.
- 11- SELLA E.J., CAMINEAR D.S., McLARNEY E.A.: Haglund's syndrome. *J. Foot Ankle Surg.*, 37: 110-4, 1998.
- 12- WATSON A.D., ANDERSON R.B. and DAVIS W.H.: Comparison of results of retrocalcaneal decompression for retrocalcaneal bursitis and insertional Achilles tendinosis with calcific spur. *Foot Ankle Int.*, 21: 638-42, 2000.
- 13- ANGERMANN P.: Chronic retrocalcaneal bursitis treated by resection of the calcaneus. *Foot Ankle*, 10: 285-7, 1990.
- 14- BRUNNER J., ANDERSON J.A., O'MALLEY M., BOHNE W., DELAND J. and KENNEDY J.: Physician and patient based outcomes following surgical resection of Haglund's deformity. *Acta Orthop. Belg.*, 71: 718-23, 2005.
- 15- GREEN A.H., HASS M.I., TUBRIDY S.P., GOLDBERG M.M. and PERRY J.B.: Calcaneal osteotomy for retrocalcaneal exostosis. *Clin. Podiatr. Med. Surg.*, 8: 659-65, 1991.
- 16- REINHERZ R.P., SMITH B.A. and HENNING K.E.: Understanding the pathologic Haglund's deformity. *J. Foot Surg.*, 29: 432-5, 1990.
- 17- JEROSCH J., SCHUNCK J. and SOKKAR S.H.: Endoscopic calcaneoplasty (ECP) as a surgical treatment of Haglund's syndrome. *Knee Surg. Sports Traumatol. Arthrosc.*, 15: 927-34, 2007.
- 18- SAMMARCO G.J. and TAYLOR A.L.: Operative management of Haglund's deformity in the non-athlete: A retrospective study. *Foot Ankle Int.*, 19: 724-9, 1998.
- 19- NUNLEY J.A., RUSKIN G. and HORST F.: Long-term clinical outcomes following the central incision technique for insertional Achilles tendinopathy. *Foot Ankle Int.*, Sep., 32 (9): 850-5, 2011.
- 20- XIA Z., YEW A.K.S., ZHANG T.K., SU H.C.D., NG Y.C.S. and RIKHRAJ I. S. : Surgical Correction of Haglund's Triad Using a Central Tendon-Splitting Approach. *J. Foot Ankle Surg.*, Nov.-Dec., 56 (6): 1132-8, 2017.
- 21- McGARVEY W.C., PALUMBO R.C., BAXTER D.E. and LEIBMAN B.D. : Insertional Achilles tendinosis: Surgical treatment through a central tendon splitting approach. *Foot Ankle Int.*, 23: 19-25, 2002.
- 22- JOHNSON K.W., ZALAVRAS C. and THORDARSON D.B.: Surgical management of insertional calcific achilles tendinosis with a central tendon splitting approach. *Foot Ankle Int.*, 27 (4): 245-50, 2006.
- 23- ORTMANN F.W. and McBRYDE A.M.: Endoscopic bony and soft tissue decompression of the retrocalcaneal space for the treatment of Haglund deformity and retrocalcaneal bursitis. *Foot Ankle Int.*, 2: 149-53, 2007.
- 24- LEITZE Z., SELLA E.J. and AVERSA J.M.: Endoscopic decompression of the retrocalcaneal space. *J. Bone Joint Surg. Am.*, 85 (8): 1488-96, 2003.

## الإستئصال الجراحي لتشوه هاجلند بطريقة شطروتر أخيليس

لقد وصف تشوه هاجلند لأول مرة بواسطة باتريك هاجلند عام ١٩٢٧ ويعرف أيضاً بإسم آخر وهو بروز عظمي خلف العقب، وحقيقة لا يوجد مسببات واضحة لهذا المرض ولكن تم إقتراح بعض المسببات مثل الأقدام ذات الأقواس المرتفعة وعوامل وراثية أخرى قد تكون من ضمن مسببات هذا المرض.

ومن أعراض هذا المرض وجود ألم في الجزء الخلفي للعقب والذي يظهر أكثر بعد الراحة وهذا الألم نتيجة إلتهاب وتر أخيليس أو الجراب المحيط بالوتر، وهذه الأعراض مشابهة لبعض أسباب آلام الجزء الخلفي من العقب مثل إلتهاب الجراب الوتري وإلتهاب اللقافة الأخمصية.

وعادة ما يصيب هذا المرض كلا الجنسين لكن مشهور أكثر بالإناث، وعادة ما يصاب به الأصغر سناً خاصة في العقد الثاني والثالث من العمر.

ويعتمد تشخيص هذا المرض بالأساس على التاريخ المرضي والفحص السريري للمريض وقد تساعد بعض التغيرات الإشعاعية في تشخيص المرض حيث لا يوجد تغيرات واضحة خاصة في المراحل المبكرة للمريض.

ويوجد بالصورة الإشعاعية الجانبية للعقب بروز عظمي في الجزء الخلفي العلوي للعقب وقد يرتبط أيضاً بوجود شوكة (مهماز) أو تكون عظام جديدة عند موضع إرتكاز الوتر بالعقب.

ويوجد طرق مختلفة لعلاج هذا المرض مثل علاجه تحفظياً عن طريق تغيير طبيعة الأحذية ووضع وسادات للأحذية وإستخدام قارب من الثلج لتقليل الإلتهاب والتورم وعمل تمارين التمدد والعلاج الطبيعي الذي قد يساعد في تخفيف حدة الألم وفي حالة عدم فاعلية العلاج التحفظي يتم إستخدام خيارات العلاج الجراحي.

ويوجد العديد من طرق التدخل الجراحي لعلاج هذا المرض مثل إستئصال الجزء الخلفي العلوي من العقب وعمل تنظيف للأنسجة الملتهبة أما جراحياً أو بواسطة المنظار الجراحي.

بالنسبة للإستئصال الجراحي فيوجد عدة طرق أما عن طريق النهج الأنسي أو الوحشي أو عن طريق شطروتر أخيليس.

والغرض من هذه الدراسة هو تقييم نتائج الإستئصال الجراحي لتشوه هاجلند بطريقة شطروتر أخيليس.

وقد إشمئل هذا البحث على ٢١ حالة ممن يعانون من تشوه هاجلند والذين تم علاجهم بواسطة الإستئصال الجراحي بواسطة شطروتر أخيليس خلال الفترة أغسطس ٢٠١٦ وحتى أغسطس ٢٠١٧. وتراوحت أعمار الحالات ما بين ٣٢ سنة و٥٦ سنة (متوسط أعمارهم ٤٢ سنة)، ثلاثة عشر منهم إناث.

وقد تم متابعة جميع الحالات بصورة دورية إكلينيكية وعن طريق الأشعة لمدة تتراوح بين ستة وإثنى عشرة شهر (متوسط ثمانية أشهر ونصف الشهر).

تم تقييم نتائج هذا البحث بواسطة إستبيان مجتمع لاعظام الأمريكي للقدم والكاحل وكانت النتيجة النهائية لهذه الدراسة مرضية في ٩٥.٢٪ من الحالات وغير مرضية في ٤.٨٪ من الحالات.

ولم يتضح وجود مضاعفات فيما عدا إلتهاب سطحي بالجرح بحالتين وتم علاجهم بواسطة المضادات الحيوية.

وتم مناقشة هذه النتائج ومقارنتها بتلك المذكورة في المراجع والأبحاث والمجلات العلمية.

من وقائع النتائج السابقة يمكن إستنتاج الآتي:

- أن الإستئصال الجراحي لتشوه هاجلند بطريقة شطروتر أخيليس هي عملية آمنة ولها نسبة نجاح عالية.
- أن هذه الطريقة تمكن الجراح من إستئصال كافة الأنسجة المريضة في الجزء خلف العقب وعمل تنظيف للوتر بطريقة جيدة وتمكن الجراح للوصول لهذه المنطقة بطريقة أسهل من الطرق الأخرى.
- أن هذه الطريقة لها نتائج عالية مع تقليل نسبة المضاعفات مثل تأثر الإمداد الدموي لوتر أخيليس وتأثر العصب السورالي.