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Chevron Akin Osteotomy – An Audit of Surgical Outcomes

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Rationale

- **Over 150 different procedures described for HAV correction, the Chevron or Austin osteotomy arguably has the most evidence to support its use from the published research evidence ^{1,2}.**
- **Interested in the complication rate associated with this procedure.**
- **Opportunity to compare MYHT with national PASCOM data and published research data.**
- **Avascular necrosis and the Chevron Osteotomy ³.** Controversy existed over the use of the Chevron Akin distal metatarsal osteotomy in the 1980's and 1990's as Meier & Kenzora, (1985) reported a high incidence of avascular necrosis (AVN) of the first metatarsal head following this procedure.
- **Transfer Metatarsalgia ⁴.** Transfer Metatarsalgia is the most common cause of continuing dissatisfaction with the outcome of HAV surgery

1. Ferrari, J. Higgins, J.P., Prior, T. (2004). Interventions for treating Hallux Valgus (abductovalgus) and bunions. [Cochrane Database, Systematic review.](#)

2. Kilmartin, T.E. (2006). 'Critical Review: The Surgical Management of Hallux Valgus' [British Journal of Podiatry](#), Vol 9, No. 1, pp 4-24.

3. Meirer, P.J., Kenzora, J.E. (1985) The Risks and Benefits of Distal First Metatarsal Osteotomies. [Foot & Ankle](#). Vol. 6, No. 1, pp:7-17.

4. Kilmartin, T.E. (2002). 'Revision of Failed Foot Surgery: A Critical Analysis' [The Journal of Foot and Ankle Surgery](#), Vol. 41, No. 5, pp:309-315



Chevron

- The Chevron Osteotomy described by Miller ⁵. eponymously accredited to Austin ⁶.
- Common procedure used for the correction of Hallux Valgus in podiatry at MYHT
- Used for mild to moderate IM angles
- DMO procedure, simple and quick to perform one point of fixation, inherently stable, allows early mobilisation.
- Mixed reports of incidence of AVN ^{7,8,9}.
- Currently no formal MYHT data on surgical outcomes



5. Miller. S., Croce, W.A. (1979). The Austin Procedure for Surgical Correction of Hallux Abducto Valgus.. Journal of the American Podiatry Association. No. 69, pp:110-118.

6. Austin, D.W., Leventen, E.O. (1981). A New Osteotomy for Hallux Valgus. Clinical Orthopaedic Related Research. No, 157, pp: 25-30.

7. Donnelly R, Saltzman C, Todd, K, Johnson K, Modified Chevron Osteotomy for Hallux Valgus. Foot and Ankle International 1994 **15**(12): 642-645.

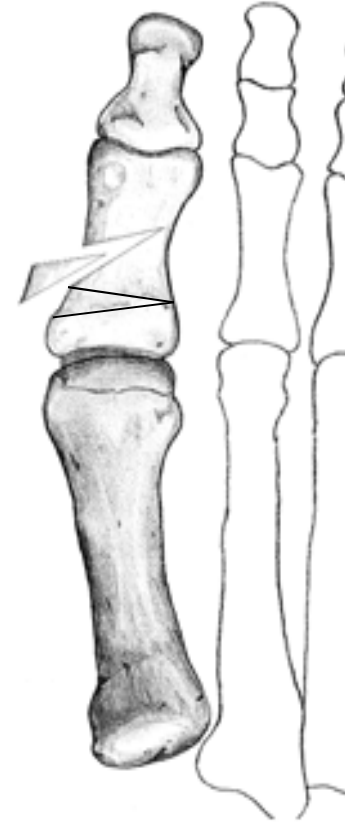
8. Green M, Avascular Necrosis following distal chevron osteotomy of the first metatarsal. Journal of Foot and Ankle Surgery 1993 **32**(6):617-621.

9. Jones K, Feiwell L, Freedman E, Cracchiolo A, The effect of chevron osteotomy with lateral capsular release on the blood supply to the first metatarsal head. The Journal of Bone and Joint Surgery 1995 **77**(2):197-204.



Akin

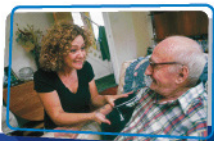
- First described by Akin in 1925 as a single procedure for the correction of Hallux Valgus¹⁰.
- Often performed as an adjunct to a first metatarsal osteotomy such as the Chevron¹¹.
- Low patient satisfaction rates when this procedure is used in isolation¹².



10. Akin, O.F. (1925). The Treatment of Hallux Valgus – a new operative procedure and its results. *Medical Sentinel*. No. 33, pp:678-679.

11. Banks, A. (1999). "Avascular Necrosis of the First Metatarsal Head: A Different Perspective." *Journal of American Podiatric Medicine Association* Vol: 89, No. 9, pp: 441-453.

12. Plattner, P.F., Van Manen, JW. (1990). Results of akin type proximal phalangeal osteotomy for correction of Hallux Valgus Deformity. *Orthopaedics*. Vol: 13 No. 9, pp: 989-996.



Setting Audit Criteria

- ‘Principles for Best Practice in Clinical Audit’¹³ stresses the importance of identifying criteria at the start of the audit process.
- Ten surgical outcomes criteria were identified, based on their potential for morbidity or mortality.
- These criteria were then benchmarked against best available PASCOM data and rates from published literature.

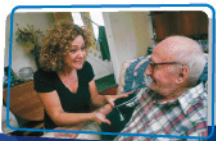
13. National Institute of Clinical Excellence, Commission for Health Improvement, Royal College of Nursing and The University of

Leicester (2002). Principles for Best Practice in Clinical Audit. Oxon: Radcliffe Medical Press



Audit Criteria for Benchmarking

- 1. Avascular Necrosis:** PASCUM rate of 3 in 10,274
- 2. Infection suspected:** PASCUM rate of 166 cases of infection in 10,274
- 3. Transfer Metatarsalgia:** PASCUM rate of 127 cases in 10,274
- 4. Revision Rate:** 5 cases in 246 patients (Larholt and Tagoe, 2008).
- 5. Removal of Metalwork:** PASCUM rate of 375 in 10,274



Audit Criteria for Benchmarking

6. CRPS: PASCOM rate: 15 in 10,274

7. Severe Post-Operative Pain: PASCOM rate: 167 in 10,274

8. Recurrence/insufficient correction: PASCOM rate: 150 in 10,275

9. DVT: PASCOM rate: 9 in 10,274

10. Problematic Scarring: PASCOM rate: 221 in 10,274



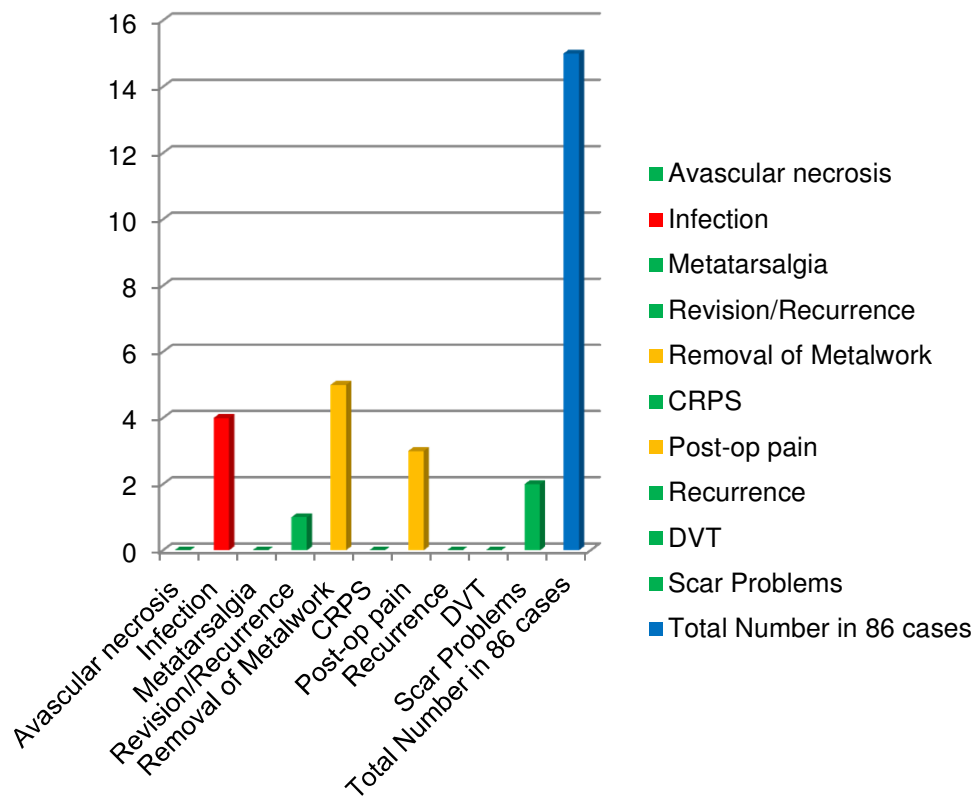
Data Collection

- A retrospective review of 86 case notes was performed to gather the MYHT audit data.
- Chevron Akin procedure standardised as same surgeon for all cases
- Audit tool designed for data collection
- Systematic methodology generated for gathering data from notes



Audit Results

Bar Chart Showing Frequency of Complications in 86 cases of Chevron Akin Osteotomy



Criterion Number	Frequency in 86 cases
1. Avascular necrosis	0
2. Infection	4
3. Metatarsalgia	0
4. Revision/Recurrence	1
5. Removed Metalwork	5
6. CRPS	0
7. Post-op pain	3
8. Recurrence	0
9. DVT	0
10. Scar Problems	2
Total Complications	15



Benchmarking Data Analysis

- z-test for equality of two binomial proportions used to compare Podiatry MYHT data with PASCOM or Literature
 - For numerical, binomial data, where the samples are independent and the sample size is fixed in advance
- The z-test allows statistical benchmarking to be performed as it informs the researcher if one set of results is equal to another when two independent samples are compared
 - If a probability is extremely small or large, the z-test becomes less accurate ¹⁴.

14. Hildebrand, D.K., Lyman, O., Gray, J.B. (2005). Basic Statistical Ideas for Managers, 2nd ed. California: Belmont, Thomson Brooks/Cole.



Audit Results

- There was a suspected infection rate of 4 in 86 which was higher than the national rate, this prompted a further review of the notes...2 were superficial skin infections confirmed by positive swab, 2 negative swab reports all cleared with 7 days 500mg Flucloxacillin qds.
- A 'proven' infection rate of 2 in 86 was consistent with national findings, there were no cases of OM.
- Removal of metalwork 5/86, notes reviewed again and all akin screws, although statistically equivalent to national data, a change in technique has been introduced to help reduce this number.
- All other criteria were statistically equal to National PASCUM levels, no recommendations for change in practice were made based on these findings.
- Incidental audit findings:
 - 2 patients had prolonged P/O swelling limiting footwear
 - Problems with paper-based patient records e.g. Incomplete theatre notes, missing tourniquet times, missing signatures from staff. Although all of the data was electronically captured via the consultant via Bluespiner, paper notes were incomplete in some instances with some missing care plans.



Implementing Change

- Adopt PASCOM and incorporate patient related outcome measures.
- Podiatric Surgery in MYHT will review procedure specific data on an annual basis.
- Now have historical procedure specific data for patients, colleagues and commissioners.



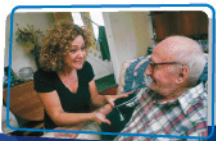
Implementing Change

- PASCOM data access
 - Unable to access procedure specific **national** data without additional funding, looking into accessing this data in the future



Conclusion

- The Audit Data supports the selection of the Chevron Akin procedure.
- It is a safe procedure with a low surgical complication and morbidity rate, when performed on a day case basis under LA.
- MYHT patients undergoing this procedure can now make a more informed choice for this elective procedure.



References

1. Ferrari, J. Higgins, J.P., Prior, T. (2004). Interventions for treating Hallux Valgus (abductovalgus) and bunions. Cochrane Database, Systematic review.
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5. National Institute of Clinical Excellence, Commission for Health Improvement, Royal College of Nursing and The University of Leicester (2002). Principles for Best Practice in Clinical Audit. Oxon: Radcliffe Medical Press.
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12. Banks, A. (1999). "Avascular Necrosis of the First Metatarsal Head: A Different Perspective." *Journal of American Podiatric Medicine Association* Vol: 89, No. 9, pp: 441-453.
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