Management of Severe OA of the Knee Using a V-VAS™ Customised Off-Loading Knee Orthosis

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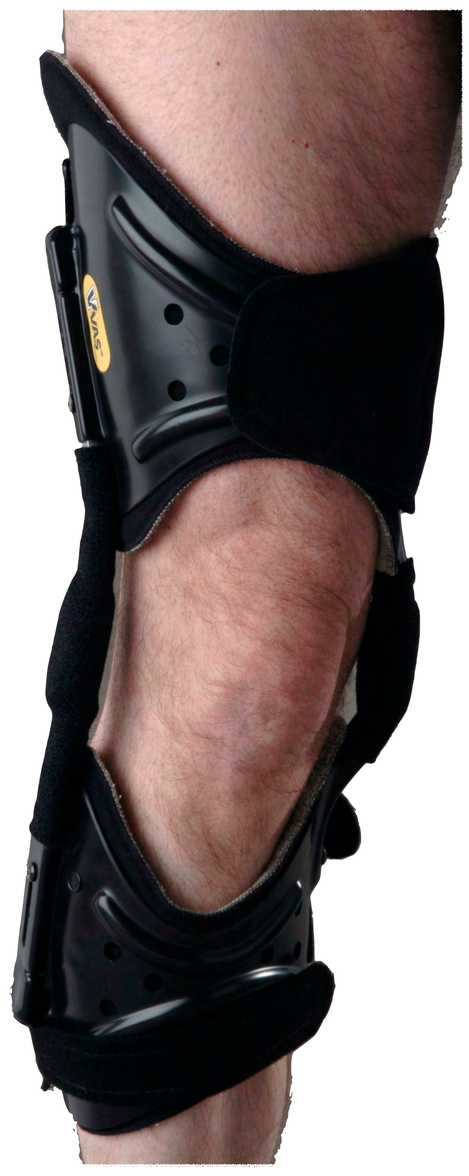
SUMMARY:

This study reports the results of using a custom-made knee orthosis, the V-VAS™ as an alternative to surgical intervention

INTRODUCTION:

Various orthosis designs exist for the management of patients with osteoarthritis of the knee. Custom or off-the-shelf unloader knee orthoses are widely used for relieving pain during weight bearing activities in patients with uni-compartmental osteoarthritis. Although these designs can be mechanically successful, patient tolerance may be low due to a higher concentration of pressures being exerted by straps or condylar pads. This is especially so with severe deformity and can limit the duration over which an orthosis can be tolerated.



The authors have applied a new custom orthosis design (V-VAS™) in an experience of over 100 fittings. This design was investigated due to its ability to fine-tune comfort levels at fitting, its light weight and relatively efficient biomechanical design.

METHODS:

The Varum Valgum adjustable stress (V-VAS™) custom knee orthosis is a new concept for treating patients who present with medial or lateral compartmental arthropathies.

Its design incorporates features intended to increase both effectiveness and compliance. Instead of using a narrow frame as seen on most designs, it uses a total contact cuff on the thigh and tibia along with an adjustable, self aligning, polycentric joint system to create four points of pressure instead of three. There is no need for a condylar pad. This results in increased comfort.

The system's self-aligning, polycentric hinge design, has a means of linearly adjusting the varum or valgum angle (depending on which compartment is affected) without causing mechanical joint binding. Even with quite severe deformity the joints fit close to the knee without binding.

Sample Case (MD - 47yrs)

History

- 1985 left knee arthroscopy & open medial menisectomy
- 1995 repeat arthroscopy shows complete loss of medial chondral surface
- 2005 right knee arthroscopy - bone on bone contact. Both knees moderate PFJ and lateral compartment chondral loss.

Examination

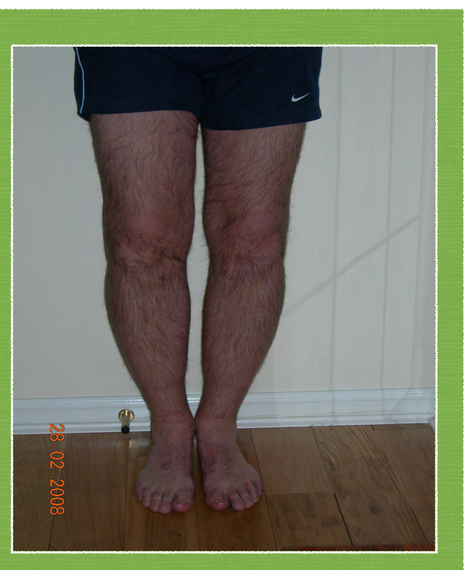
- Bilateral clinical varus >20 degrees
- Both knees lack 5 degrees full extension
- Moderate effusion right knee only
- Severe pain and swelling right knee

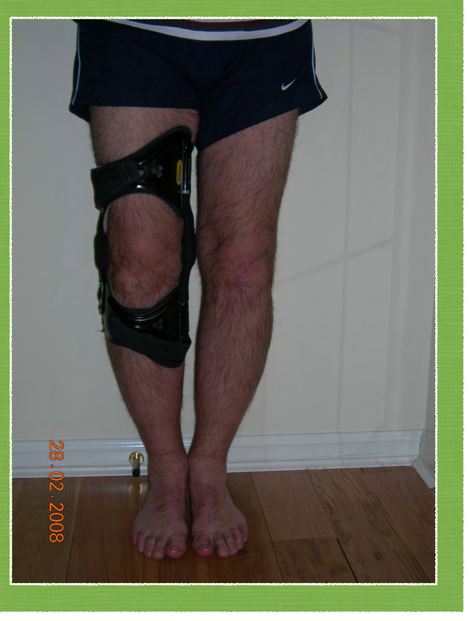
Observations

- Too young for joint replacement
- Too severe for chondral resurfacing
- Too advanced for high tibial osteotomy
- May be suitable for Benjamin's double osteotomy

Interpretation of Outcomes

- Brace initially used 2 - 4 hours per day
- Now used during working day
- Excellent reduction in pain and swelling of right knee
- Weight-bearing Xray
- No brace 11 deg Varus
- With brace 4 deg Varus





The two main patient groups selected for the V-VAS were those presenting with valgus /varus deformity of the knee in excess of 10 degrees and medically unfit for surgery (**GROUP 1**), or those too young to be considered for knee replacement surgery (**GROUP 2**).

In Group 2, bracing was seen as an earlier option than osteotomy and could be used in conjunction with pain-relieving injection therapy

Patients liked the fact that the design closely followed the profile of the knee without binding. Each patient was assessed radiographically and a custom cast made of the knee. Partial correction of deformity by the orthotist during cast taking was found to be important in minimising user discomfort. The patient's perception of pain was used as an indicator of the optimum position during cast taking. It is likely that by demonstrating that pain relief could be achieved during casting, the patients expectations of the brace were raised.

At the fitting stage, the design of the orthotic joint was such that fine adjustments of the amount of offloading were possible. Immediate feedback on pain relief was a very positive aspect of the design. By encouraging the patient to walk up and down stairs ar the fitting stage, the orthotist was able to fine tune the brace performance without the need to remove and reapply.

Radiological assessment before and after use and the decrease in pain on movement were the primary methods of measurement of clinical effectiveness.

RESULTS:

Due to the age range it was important the brace was simple to apply, lightweight and neat in appearance as a high level of compliance was important.

The aim of the bracing strategy was to reduce as much as possible the pain levels and where appropriate, increase levels of mobility.

Group 1- All patients were asked after 6 weeks if they would willingly return the device - All refused.

All patients reported reduction in their pain by 50-70% using a simple 1-10 visual-analogue pain scale. Over 50% reported an increase in mobility in terms of their day to day tasks.

Based on their individual experience, patients had a further 5cm distraction added at this point. In all cases the patients reported that the quality of life outcomes exceeded their expectations.

Group 2 - One patient found the brace difficult to use due to a hypersensitivity following trauma and derived little or no benefit.

One patient had initial benefit, reporting 50% pain reduction, however went on to elect for surgery . The remainder reported reduction in pain by 50-70%. They were not willing to go without their brace. Mobility was improved with around 10% returning to some form of activity such as the gym or hill walking. Two patients who were clinically obese reported migration of the brace in-situ as a problem.

CONCLUSION:

The V-VAS was found to be an ethical and effective device in both study groups with 90% demonstrating significantly improved pain and mobility

REFERENCES:

1. Finger S, Paulos LE. Clinical and Biomechanical Evaluation of the Unloading Brace. Journal of Knee Surgery 2002; 15: 155-159.
2. Pollo FE, Otis JC, Backus SI, Warren RF, Wickiewicz TL. Reduction of Medial Compartment Loads with Valgus Bracing of the Osteoarthritic Knee. The American Journal of Sports Medicine 2002; 30:3: 414-421