‘Silicone Bikini socket’ Hip Disarticulation A CASE STUDY

PRESENTERS: Lynzy holding and Terry Moore
Guest presenter Damian Harper

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INTRODUCTION

- Only 2% of all amputations are at the hip disarticulation level, [1] Prosthetists have found it challenging to develop a consistent prosthetic fitting.

- Standard Hip disarticulation Prostheses have a high rejection rate due to the socket weight, donn and doff issues, increased energy requirements, and more importantly the socket interface which is usually very bulky and uncosmetic.

- Traditionally sockets have been manufactured using a combination of blocked leather, flexible plastics and laminates and lacing sections.

- The energy requirements for the hip disarticulation amputee have been estimated to be as much as 200% greater than those for normal human ambulation.2

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Introduction…..cont

- Over the past 6 years, sockets have developed for this level at Aintree, with the introduction of the full silicone socket. This has been our first choice for a number of years now as it is fully flexible and very comfortable.

- The draw backs of this socket are that it still requires a lace up section or Velcro straps to fasten it and is still quite heavy. Recent study's suggest that focusing more on the patients skeletal anatomy within the residuum rather than the soft tissues when creating a socket, will achieve more optimal results and reduce the movement between the socket interface and the residuum.

- Damian is an established patient at Aintree with this level of amputation, he asked Terry and I if we would look at a new style of socket and suspension he had seen on YouTube currently being used in the States. ‘The Bikini Socket’ developed by Martinbionics.

- Damian currently wore a full soft silicone socket in combination with the Helix hip and C leg.

- We agreed to contact the manufacturer and look at designing a more anatomical socket for Damian

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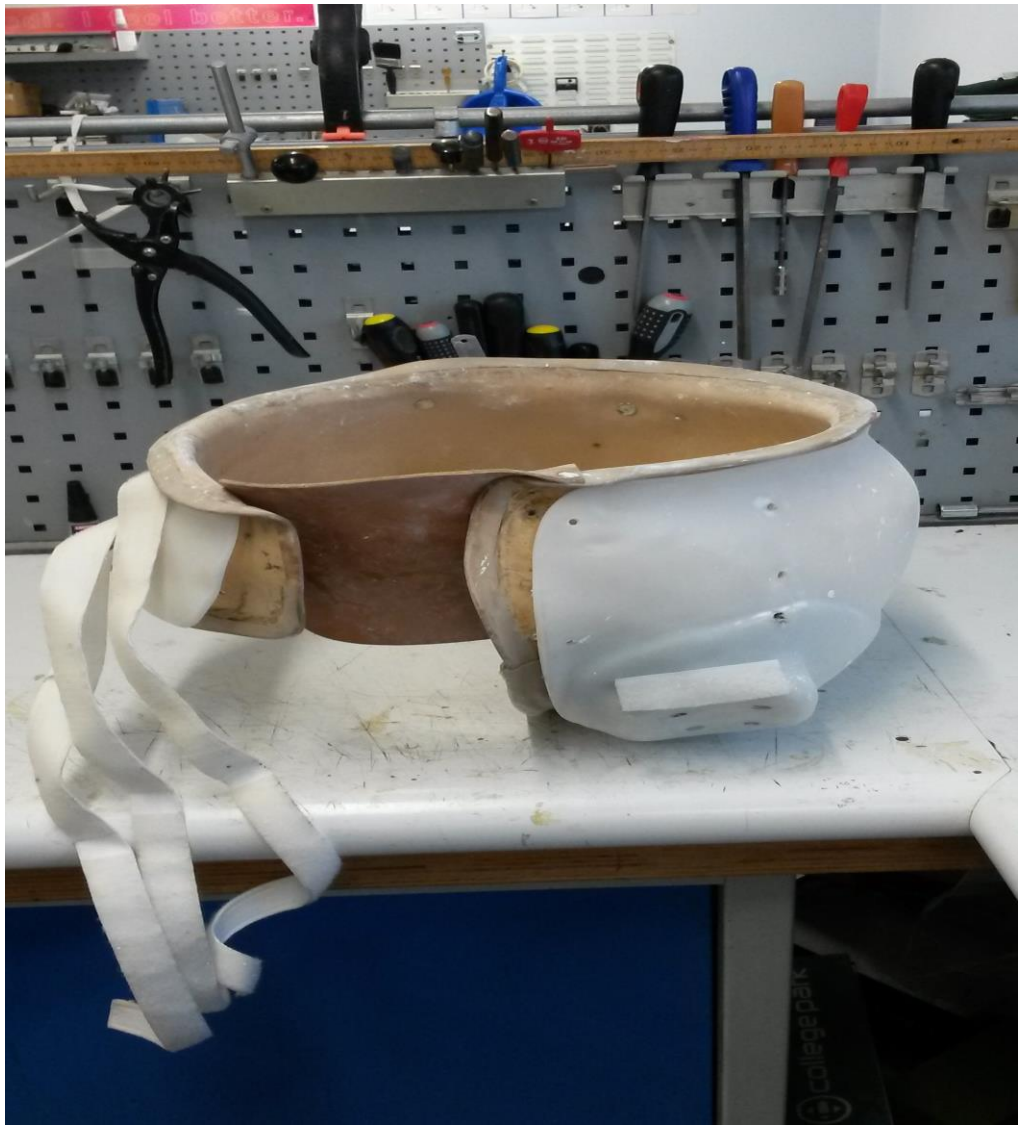

Traditional socket -Pre Silicone

Polypropolene outer socket
Leather inner
Velcro fastenings

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Standard Aintree silicone socket

One socket interface
Fully flexible for sitting

Heavy
Lacing section needed
Pts complained of increased sweating in warmer weather
Drop off still occurs in swing phase

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Standard full Silicone socket

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The request → The Martin Bionics ‘Bikini’ socket

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Methodology

- To start with we used Damian's current cast from the full silicone socket as we wanted to capture the exact alignment of his current set up on the C.leg and Helix hip.
- If a new cast is necessary then a 'Total suspension' casting technique is used at Aintree for hip disarticulation to contain the soft tissue and achieve a better volume match within the socket. It requires 2 prosthetist's. We use elasticated bandage under the residuum held as tight as possible by a one prosthetist then slabs of plaster bandage is applied by the other . This achieves a closer fit than using the traditional method with the blocks.
- The rectification must drastically reduce the original size of the positive model to achieve the best outcome when using the bikini style suspension. A polyethelene dynamic test socket is always used.
- Stability of the new hip disarticulation socket still relies primarily on the alignment, comfortable axial support, and suspension.

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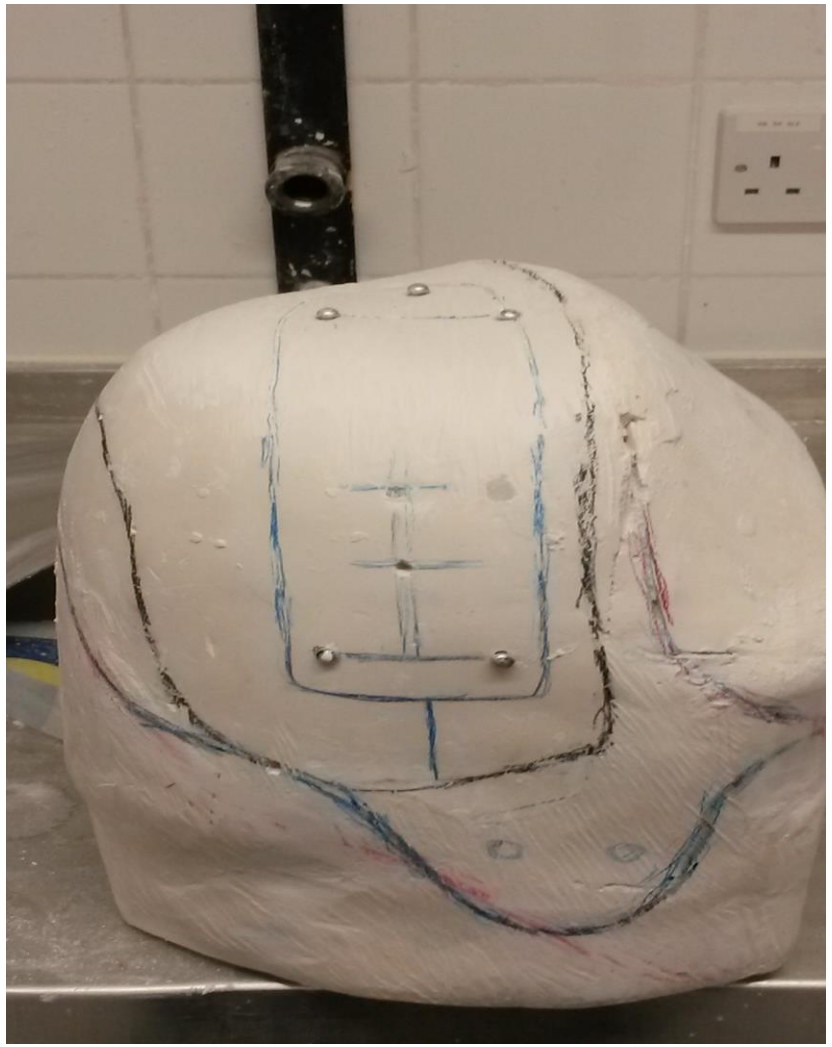
The manufacturing process – test socket



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Manufacturing process test socket….

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Dynamic Fitting

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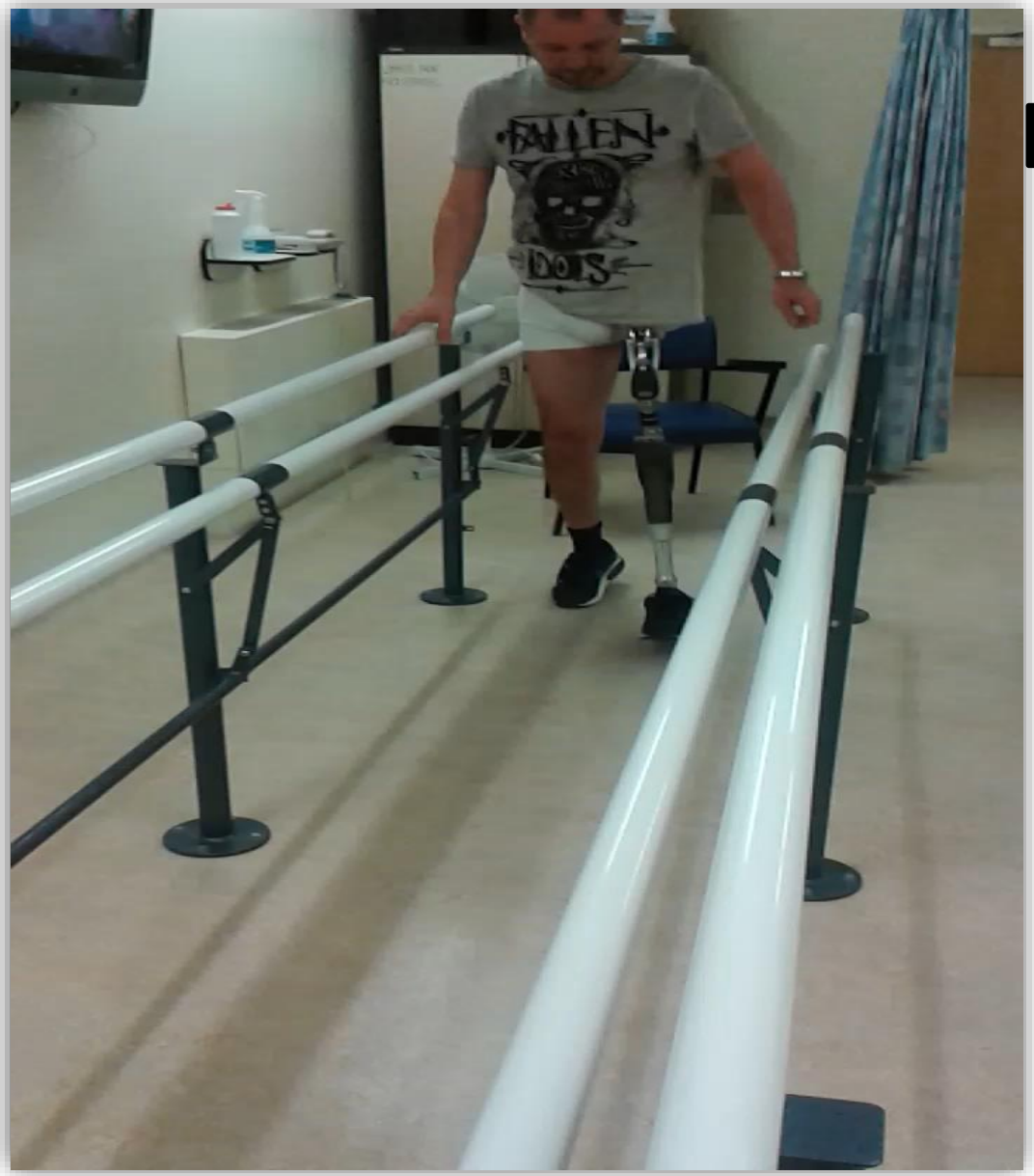

Dynamic fitting video

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Patient experience/results

- We delivered the 1st prototype of this socket in carbon fibre for strength and cosmetic appearance then Damien went home to trial it.

- Although there were many positives to the design…..we did have a few stumbling blocks…literally!!

- Damian found that the socket was not very forgiving when turning in small spaces at home and did have a couple of falls. He also found that the iliac stabilisers were too low and causing some discomfort.

- From this experience we went back to the drawing board and decided to make a second socket but this time use silicone and add a torque absorber to the shin tube. We also re positioned the iliac stabilisers.

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Casts

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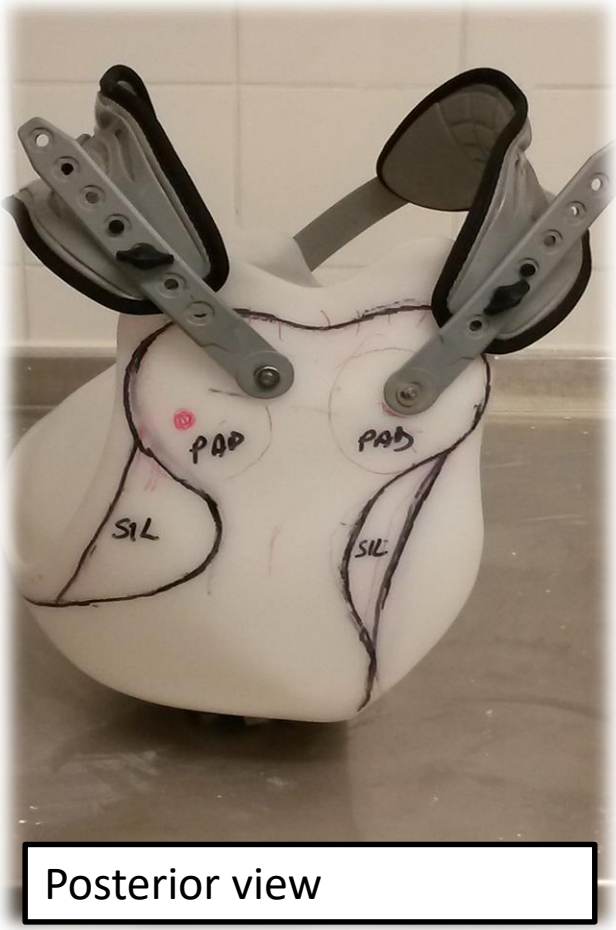
Preparation for the ‘silicone bikini’ design



Posterior view

Anterior view

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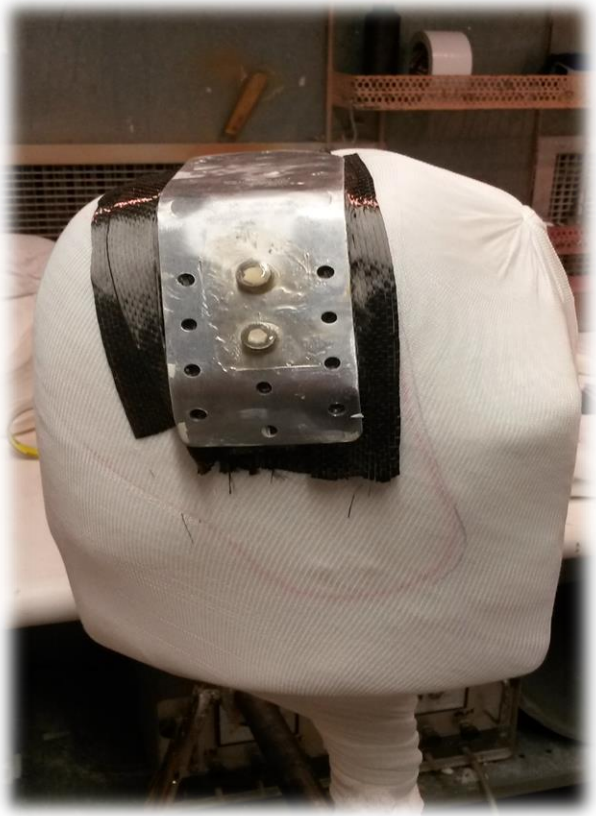
preparation cont.....



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The core plate and silicone section

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The core perforations

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The bikini socket

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The Aintree Silicone Socket

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Conclusions

- We now provide a strong, comfortable socket which supports the patient throughout the gait cycle.
- We have solved the drop off issue at swing phase.
- The flexibility of the proximal edges allows a greater range of movement and is more forgiving when the patient is sitting down.
- The patient can release the iliac stabilisers to create more room within the socket when sitting and quickly secure it again if needed

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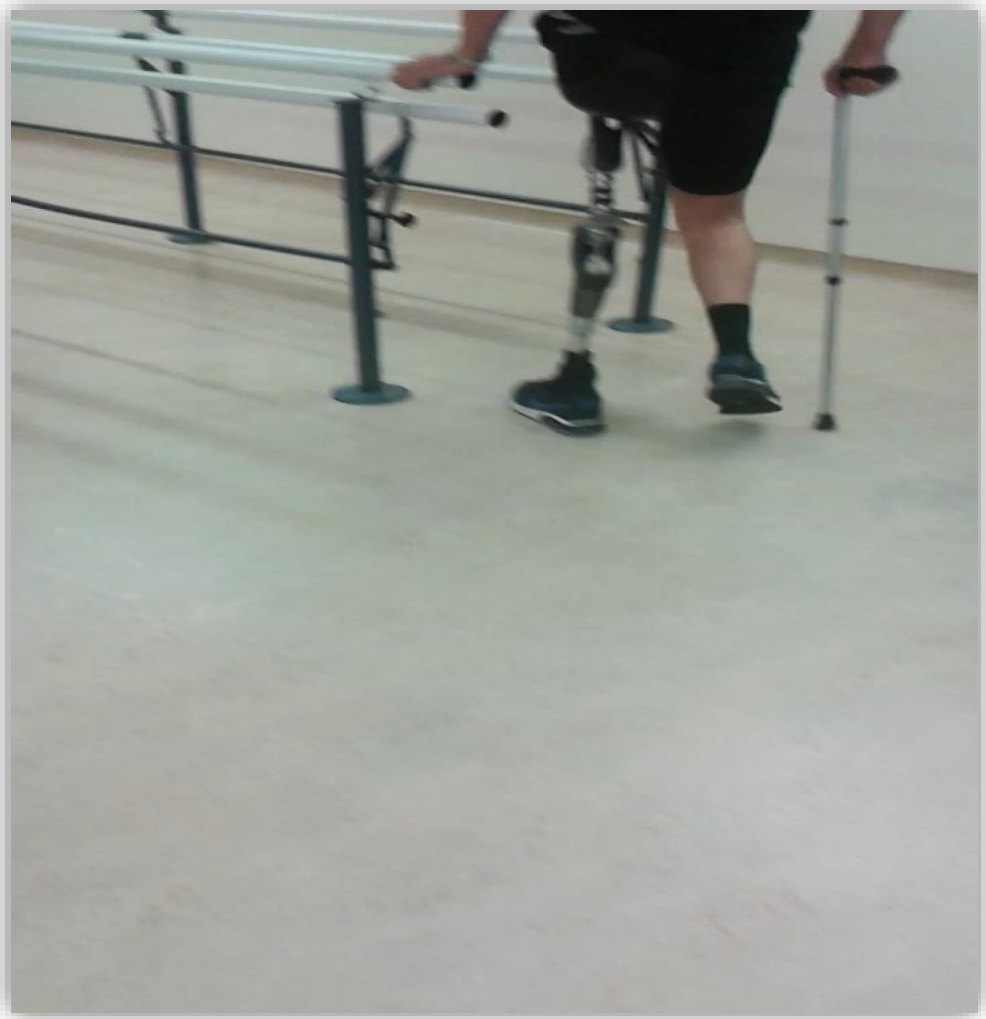
Final socket video



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Final socket

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Damian Harper

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Thank you

- Any questions???

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reference's

- 1. Wilson AB. Limb Prosthetics, 6th ed. New York: Demos Publications; 1989
- 2. Vander Waarde T, Michael J. Prosthetic management. In: American Academy of Orthopaedic Surgeons. Atlas of Limb Prosthetics: Surgical, Prosthetic, and Rehabilitation Principles, 2nd ed. St. Louis: Mosby-Year Book; 1992:539-552

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