



THE BRITISH HIP SOCIETY



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British Orthopaedic Meeting, Liverpool, September 2019 BHS Revalidation Session Newsletter

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Association

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Welcome!

It is almost one month since an excellent meeting of the British Orthopaedic Association in Liverpool. The British Hip Society, as ever, had a strong presence with a morning of free papers chaired by Past President Andrew Manktelow and Debbie Shaw from Wrightington. The second day saw the BHS revalidation session and the Sir John Charnley Lecture, delivered this year by Professor Henrik Malchau from the Sahlgrenska Institute in Sweden. We are extremely grateful to the



Charnley Trust for supporting this annual lecture as, without their support, it is unlikely we would be able to host such excellent speakers from around the world. I am very grateful to Jonathan Howell for writing a summary of Henrik's lecture which can be found in the pages below. On behalf of our President, Steve Jones, we would like to thank all of the speakers in the revalidation session who clearly took a significant amount of time to prepare stimulating talks on a range of important issues that affect us all in the world of hip surgery. Without them, it would not have been possible to run the session and we owe them a debt of gratitude – Thank you!

The revalidation sessions were very well attended by BHS and non-BHS members and were followed with an Extraordinary General Meeting of BHS members at which the Executive outlined where the BHS is at

the moment in terms of situation and strategy and where we hope to be in future. The minutes of that EGM can be viewed in the members' area of the website - please do take some time to have a read.

I appreciate that there were many members who, due to work or family commitment were not able to attend the session and I felt it would be helpful to prepare a summary of notes I made at the time and I'm grateful to those speakers who provided me with slides to help that. I'm also grateful to the members of the Non-Arthroplasty User Group who ran a separate session and have provided me with a summary of their talks that I have edited below.

We hope you enjoy reading this and we look forward to keeping you updated on future developments and hope to meet you all in Newport next March for the BHS Annual Meeting.



Matt Wilson
Hon. Secretary
British Hip Society

Early Revision following THA – Prevention & Treatment

This session was chaired by our current and future Presidents, Steve Jones & Jonathan Howell, who oversaw a broad range of expert opinion on various themes aiming to avoid early complications and deal with post-operative problems.

The burden of early revision remains a significant problem following primary THA, resulting in compromised outcome for patients and an increased risk of re-revision. The revalidation session started by highlighting the burden of early revision and the how pre-operative planning can predict & potentially avoid/minimise complications. Thereafter topic specific presentations covered the more common complications including infection, dislocation, and peri-prosthetic fractures. The following are commentaries based on the lectures kindly given by the invited speakers below.

The burden of early revision Mr Michael Whitehouse



Mike outlined data from the 2019 Annual Report of the National Joint Registry, downloadable [here](#), focusing on early revision and re-revision rates in particular. One-year revision rate for the

best performing cemented THR was noted to be 0.22%, 0.31% for the best performing hybrid and 0.62% for the best uncemented combination with resurfacing producing a 1.05% revision rate at one-year post-op.

Regarding the indication for revision, all fixation methods and all bearing combinations suffered an early peak in revision due to dislocation and similar early

increases were seen for indications of infection, peri-prosthetic fracture and malalignment. Revision rates due to aseptic loosening and pain both increased with time from surgery.

One-year re-revision rates are significantly greater at 5.4% overall. Mike pointed out that the time it takes to get to revision surgery from the primary has a significant influence on the risk of re-failure. A revision within the first year of a primary produced a one-year re-revision risk of 7.31% whereas making it to five years following a primary gives a re-revision risk of 4.14%. The chance of needing a re-revision at seven years following revision surgery if that revision is performed within one year of the primary is 17.5% compared to 9.4% for patients who avoid first revision until beyond five years. Almost a doubling of the risk of re-revision following early failure.

In conclusion, Mike pointed out that the choices at primary surgery was the gift that keep on giving and may come back to bite us repeatedly! Time to first revision is important and dictates future risk of re-revision, potentially because the causes of early revision are less benign. So, to avoid early revision, look at the numbers and pick the winners!

Pre-operative planning Mr Matthew Hubble



Matthew Hubble presented a clear and logical explanation of his approach to pre-operative planning and templating with several 'top tips' for people to take away and absorb into practice. Matthew introduced the best

practice guidance for documentation produced by the Getting it Right First Time (GIRFT) programme together with the BHS and BOA and available for review [here](#).

Units should record results of templating and the outcome of any multi-disciplinary meetings recording who was present and the agreed actions. Documentation of the informed consent process should be recorded including the choice of implants and potential for use of bone graft and other relevant additional procedures.

Mathew outlined five time-points where it is worth pausing and considering the plan: at first outpatient appointment, at the MDT, in pre-op assessment clinic, at time of templating and at time out before putting knife to skin. Leaving things to the last of those is a recipe for problems for both surgeon and patient.

Clear documentation at the first outpatient appointment including diagnosis and management plan is useful for the various members of the team during the patient journey. Having the case templated in time for the MDT is helpful from a planning and educational point of view for trainees. It is worth ensuring a planning meeting for primary arthroplasty is performed in the week prior to surgery and two weeks for revisions, to allow time for any additional equipment, implants or investigations to be organised.

Matthew then outlined his method for templating, using both acetates and templating software. Scaling discs are available very cheaply and even a simple two pence piece can be used. A method for templating using acetates independent of scaling markers has been described by Brew and Hubble et al.¹

Radiographs of arthritic hips are often externally rotated making an assessment of offset difficult. Matthew suggested looking through old radiographs for a film with a less rotated view of the femur or templating the other non-arthritic side if available.

A complete overview of templating was not possible due to time constraint but Matthew

offered a link to the Exeter Hip book which contains a clear overview of templating. Matthew offered the book, as a PDF, which can be obtained by emailing sophie.kolowska@nhs.net. Matthew also commended the stem insertion depth (SID) as a method of determining how far to insert a stem to achieve the appropriate leg length. This can be measured from the templating as the distance from the tip of the greater trochanter to the shoulder of the prosthesis. This can then be referenced intra-operatively to ensure the templated plan is translated into practice. Once the size of implants and SID have been determined then these can be written on the white board in theatre so that all theatre staff are aware of the requirements for that particular case.

1. Scaling digital radiographs for templating in total hip arthroplasty using conventional acetate templates independent of calibration markers. Brew, CJ et al. The Journal of arthroplasty 27 4 (2011): 643-7

Prosthetic Joint Infection: Prevention

Professor Mike Reed



Mike started the session emphasising the importance of pre-warming our patients using either active or passive means.

Complications of hypothermia include an increased risk of pressure ulcers, transfusion requirements, greater length of stay, poor drug metabolism, cardiac events, mortality as well as a three-fold increase in surgical site infections (SSI). Passive warming includes interventions to promote heat retention (e.g. cotton blankets, reflective blankets). Active warming involves the application of external heat to skin and peripheral tissues (e.g. forced air

warming, underbody conductive heat mats and radiant warmers. This needs to be started at least 30 minutes pre-operatively and therefore the admissions suite needs to understand the importance of these methods even in pre-operative patients who are normo-thermic at initial admission. Although temperature reduces during the course of surgery, starting at a higher temperature results in a higher temperature post-operatively compared to not warming pre-op.

Taping of gloves to seal the junction between gloves and gowns has been shown, in non-clinical trials to reduced skin squame counts on the cuffs of surgical gowns. The clinic implications are unclear, but the technique is easy, cheap and potentially very cost-effective. Mike also highlighted a recent study from Byrd at al demonstrating the elimination of sleeve contamination by donning gloves before gown¹. It was also acknowledged that this method of scrubbing and gowning was used by Charnley and maybe something we all need to revisit.

In terms of surgical lavage, Mike suggested the use of Povidone-iodine, proven to reduce wound infections in spinal surgery when used to wash out wounds. A word of caution was given in regarding of using this type of wash in thyroid disease. In addition, it is important to ensure the solution is sterile - there is more than one formulation and Mike encouraged a discussion with your hospital pharmacy to ensure the appropriate solution is available.

Meticulous skin closure is clearly a vital step in reducing surgical site infections. Several companies are promoting coated sutures with the aim of reducing suture colonisation. Mike outlined the results of a randomised controlled study from Northumbria investigating the effect of using sutures coated in Triclosan, an antibacterial agent, on surgical site infection following hip and knee arthroplasty.

Although this study showed no reduction in SSI, a subsequent systematic review and meta-analysis demonstrated a significant reduction in SSI at 30 days with a relative risk of 0.73, providing moderate evidence recommending the use of these sutures. The take home message being that reduction in SSI is achieved through a series of marginal gains.

1. Donning Gloves Before Surgical Gown Eliminates Sleeve Contamination. Byrd, William A. et al. The Journal of Arthroplasty, Volume 34, Issue 6, 1184 – 1188
2. The effect of triclosan-coated sutures on the rate of surgical site infection after hip and knee arthroplasty: a double-blind randomized controlled trial of 2546 patients. Sprowson AP et al. Bone Joint J. 2018;100-B(3):296–302
3. The use of triclosan-coated sutures to prevent surgical site infections: a systematic review and meta-analysis of the literature. Ahmed I. et al. BMJ Open 2019;9

Prosthetic Joint Infection: Treatment Mr Michael Whitehouse



Following Professor Reed's talk on infection prevention, Mike Whitehouse returned to the stage to discuss treatment of infected arthroplasty. Mike was gallantly filling in for his colleague, Jason Webb, who was unfortunately unable to attend. Jason had prepared an excellent set of slides and Mike delivered them with his usual enthusiasm, knowledge and humour.

Mike started by explaining that one of the first challenges in treating infection is to define the expectation of the patients, clearly a key goal in managing any complex problem. The discussion then centred around whether a surgical or

microbiological approach had the aim of curing or controlling the infection. Knowing the 'enemy' being a key step whichever approach is chosen. Mike emphasised that multiple samples are required to make a sound diagnosis. The biofilm which makes eradication of infection so challenging probably starts within 48 hours if the initial inoculum is large enough and matures over time.

whether or not every unit should be undertaking revision surgery, particularly for infection, is a topic that needs more discussion. It is clear that expert discussion via MDT meeting is essential. Any MDT requires the presence of multiple surgeons and infection diseases doctors with particular interest in infection as well as allied professional to help support the process. Not every unit runs these types of



Regarding surgical options, simple washout should be reserved for those patients who are systemically unwell and a plan to return and formally manage the infection should always form part of the post-operative plans and discussion. The long-term antimicrobial suppression of infection should really be reserved for the minority and only after the case has been discussed at an infection multi-disciplinary team meeting (MDT). The aim, whenever possible, is to cure infection and restore function. The challenges of achieving this are not inconsiderable and

meetings and some do not have the manpower, facilities or expertise to do so. Each unit should review their practice and consider early referral to a more appropriate centre for infected cases.

Debridement and implant retention (DAIR) is one option but has certain limitations. It requires radical debridement and evidence suggests the best outcome is achieved in acute infections of less than three weeks' duration. Defining this time frame with the

delay due to haematogenous infection is a challenge.

Planning for revision surgery requires details of the index operation and details of the implants inserted. When changing parts of modular components, the implant stickers are essential to ensure appropriate components for exchange are available. Close liaison with infectious disease team and MDT meetings as well as prior anaesthetic input are all important parts of planning. As far as surgical technique is concerned, Mike recommended excision of the old scar using two size 22 scalpel blades held together. All modular implants should be removed and five deep tissue samples taken for culture and sensitivity. A recommendation was made to use a clean forceps and scalpel for each sample to minimise contamination. It is helpful to have dedicated sample-taking trays in theatre with five forceps and five scalpel handles pre-packed. Mike recommended giving antibiotics after samples retrieved although the author is aware of some research which suggests that timing of antibiotics did not seem to affect culture growth. Cemented implants can be considered modular at the stem-cement interface and after implant removal, it is recommended to burr the interface to remove any potential biofilm at this surface. Mike recommended starting the debridement at the deep layers and working superficially, ensuring a thorough debridement back to bleeding tissue with consideration given to use of a local antibiotic carrier. Careful haemostasis and meticulous skin closure are essential with the use of drains, given the evidence, down to personal preference. Kunutsor et al in their review of the outcomes of DAIR showed a reported infection-free survival at two years varied from 11-100% with an average success rate of 75% in total hip replacement. The length of antibiotic administration typically reported as two weeks of intra-venous followed by three months of oral.

1. Debridement, antibiotics and implant retention for peri-prosthetic joint infections: A systematic review and meta-analysis of treatment outcomes. Kunutsor, S et al. Journal of Infection, Volume 77, Issue 6, 479 - 488

Peri-Prosthetic Fracture Mr Steve Young



Steve presented an experienced overview of the assessment and management of periprosthetic fractures (PPF) around uncemented stems. Essential to management is a careful assessment

of the fracture pattern. Two patterns more likely to occur during broaching are cracks in the calcar and fractures of the greater trochanter. More sinister is the rarer shaft fractures, most commonly caused during stem insertion. The main concern is that these fractures are not commonly appreciated intra-operatively. Post-operative radiographs need to be carefully assessed as missed fractures can lead to late displacement with the consequent need for revision surgery a few days or weeks post-operatively.

Steve made the point that good surgical technique in planning, broaching and stem insertion is the key to avoiding these fractures. We were allowed to hear audio from Steve's research published by McConnell, Young et al that suggested the sound of the rasp impaction during femoral preparation can give clues as to when to pause or stop impaction to avoid fractures. The key being to feel, look and listen at all times.

The use of cementless prosthesis with collars is increasing and Steve showed some basic science work that is ongoing that show collars on uncemented stems

may protect against fracture for biomechanical reasons. The author presumes there is also a potential benefit in that a collar protects against subsidence which may obviate the need to push for a larger stem with better press-fit risking fracture due to oversizing. Again, good planning and technique are essential.

Steve pointed out that Dorr 'C' shaped femurs are commonly felt to be at higher risk of PPF although he felt that this was not the case as long as appropriate techniques were used. He did however advise caution with young female patients who often have a narrow antero-posterior femoral diameter.² In young men, the Dorr A femur presents a problem with narrow femoral canals and wide metaphyseal region. This pattern risks catching distally with subsequent cantilever bending and mechanical failure. Measuring canal diameter and planning ahead is essential. In addition, the use of smaller rasps with teeth right to the end of the broach can help prepare the canal and reduce the risk of intraoperative PPF.

Regarding treatment of the calcar and greater trochanteric fractures, these can be treated with a wire and Steve directed the audience to a surgical video on wiring technique produced by Martin Stone and available on YouTube™. For shaft fractures, Steve reassured us that conservative treatment can work as long as the fracture is noted on the post-operative radiograph and, if appropriate, weight-bearing status adjusted for a period of time with close follow-up. However, if there is any concern about the extent or displacement of the fracture or stem stability then reducing and fixing the fracture and possibly bypassing the stem with longer device is to be encouraged.

In summary, if a cementless stem is your choice, Steve recommended that prevention was best, predict the problem

femur, listen to the bone, use sharp broaches and fix the fracture on its merits.

1. The clinical relevance of sound changes produced during cementless hip arthroplasty. McConnell JS et al. *The Bone & Joint Journal* 2018 100-B:12, 1559-1564
2. Increased incidence of femoral fractures in small femurs and women undergoing uncemented total hip arthroplasty – why. Bonnin M. P et al. *The Bone & Joint Journal* 2015 97-B:6, 741-748

Dislocation Professor Richard King



Richard's overview of the challenges of managing dislocation started with a clear description of the problem of instability – the unstable hip has impingement, soft

tissue laxity, excessive movement or a combination of more than one of these problems. The stable hip needs minimal impingement and good soft tissue tension.

Impingement can be due to implant, surgeon or host problems. Implant issues include a skirted or wide neck on the prosthesis, poor implant positioning or bony impingement from unusual anatomy or retained osteophytes. Laxity can arise due to problems of lack of offset (see section above on planning!), poor stem or cup position or excessive soft tissue releases or inadequate repair. Excessive movement can be due to patient past-time, occupation, falls, a stiff spine or abnormal neurology. Some of these factors are modifiable, some are not. The challenge of surgery comes in finding the right balance.

In term of prevention, Richard proposed four principles to follow:

1. Identify high risk patients
Patients who are obese or have excessive osteophyte formation are at

greater risk of host-host or host-implant impingement. Patients with dysplasia may have soft tissue laxity. With certain implant systems, it can be difficult to recreate anatomy in patient with high offset. Early identification through planning and choosing appropriate implants is key. Risk factors in the medical history include: previous surgery; inflammatory arthropathy; the frail elderly; a past or current history of excessive alcohol use; neurological disorders; previous spinal problems and certain lifestyle choices may all increase the risks and should alert the surgeon to the need for extra precautions.

2. Plan every case

As well as routine planning, Richard outlined the recent developments in planning using 3D imaging to allow planning in more detail than is possible with plain radiographs. This may be particularly useful in unusual anatomy.

3. Appropriate implants placed accurately

Navigation, custom implants and robotic assistance for arthroplasty are all developments that are in use and gaining traction. In addition the increasing use of larger, but not too large heads, is improving stability and the dual mobility concept is now firmly established for use in high risk patients

4. Respect the soft tissues

There are several novel and some not so novel approaches that are being used with the aim improving not only early function but stability. Whilst better studies are required, Richard made it clear that no approach should compromise the ability to accurately place implants in the desired position. Regarding post-operative precautions, these are being relaxed at many units around the country and Richard pointed out that there is little evidence they have any effect in improving stability although and initial period of reduced activity may

protect the soft tissue repair.

Although prevention is clearly better than cure, Richard finished with an overview of the treatment of instability. He pointed out that 60% of dislocations will never recur and that post-dislocation bracing has limited evidence for efficacy. If dislocation does become recurrent then identifying the cause should be the priority. CT analysis may be useful to look at component orientation, comparing cup position, offset and femoral version with the contralateral hip. Sitting and standing radiographs can be helpful although the interpretation and decision making around the results of this are challenging. Richard felt that the use of constrained sockets is limited unless there are major soft tissue problems and said he would often favour a dual mobility construct in the majority of cases.

Leg Length Inequality

Mr Martin Stone



Martin started by the highlighting the medico-legal implications of misjudging leg length during total hip replacement. Leg length inequality (LLI) features in the top five causes for

litigation following surgery and prevention is the key.

Regarding the definition of leg length inequality, Martin outlined a survey of BHS members from 2016 that showed consensus agreement that a post-op LLI of 15mm was 'always acceptable' whereas an LLI above 23mm was 'never acceptable'. However, that is not to say that patients with LLI of 15mm are happy but it should be defensible in a court of law. There are certain patients who are more sensitive to a small LLI – those with short stature, low

offset and restricted lumbar spine movements. Some of these patients may benefit from revision surgery, after appropriate counselling, and it is important to note that the decision to revise on the basis of a subtle LLI does not constitute negligence.

Martin proposed that, over the coming years, what is acceptable in terms of LLI is likely to reduce, in part due to patient expectations but also due to new methods of planning and implant positioning described elsewhere in this newsletter. Martin's estimate was that, over the next 10 years, the acceptable LLI may drop from 15mm to just 5mm!

As with many of these post-operative problems, prevention is key and the importance of templating, planning and intra-operative checks were outlined. Martin helpfully subdivided these intra-operative checks into direct tests (measurements) and indirect tests (soft tissue tension checks). There were five recommended routine checks before final stem insertion:

1. Feel distance from the neck cut to the lesser trochanter. Typically this will be $\frac{1}{2}$ of an index finger and it is likely the distance will be underestimated.
2. The distance from the tip of the Greater trochanter to the shoulder of the prosthesis is approximately one finger although the author notes this will be different for particularly varus or valgus hips. The stem insertion depth, as described elsewhere in this newsletter can be used for non standard cases.
3. Feeling the relative position of the patellae with the legs adducted before and after surgery is helpful in estimating any change in leg length, planned or otherwise.
4. Martin described his method of performing the 'shuck test' as an assessment of soft tissue tension. With the

tibia at 20° to the floor, with a swab around the neck of the prosthesis, it should be possible to pull the femoral head to the edge of the cup, given a 'normal' soft tissue tension.

5. The 'kick-test' as a measure of tension of the rectus femoris muscle was described. As the femur is brought into extension the tibia may 'kick' forward. If this happens before the femur reaches the neutral position then it can represent a tightness of the quadriceps mechanisms. Although this may be expected following THA in certain cases, it should alert the surgeon to consider if there is an unplanned LLI.

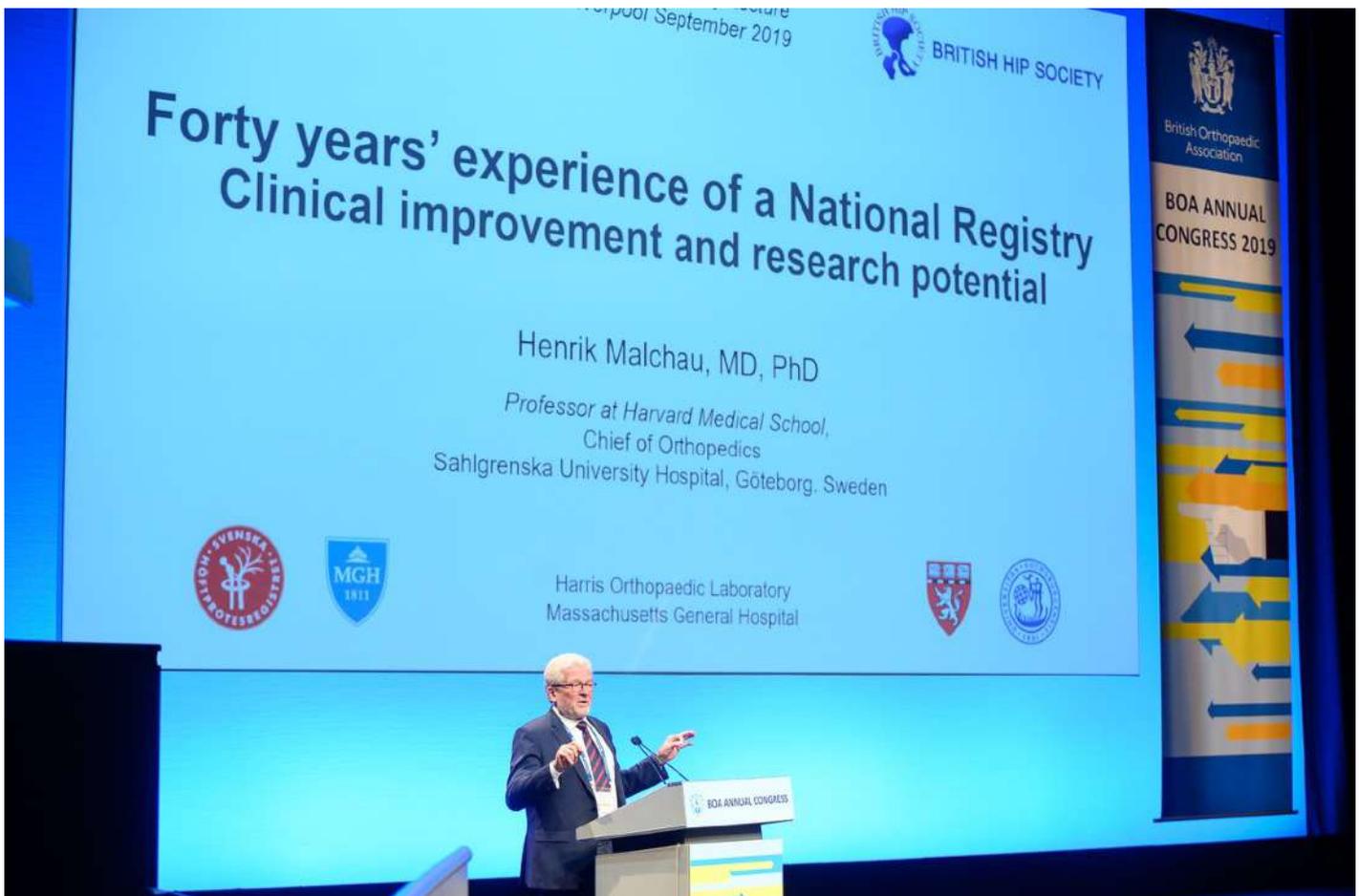
Martin finished with advice on how to ensure the operation note accurately records the care and attention you the surgeon has taken to avoid LLI. Comment such as 'leg balanced', 'five checks completed' 'leg length equal' are helpful in avoiding medico-legal problems in the future. If the leg has been left long with good reason, it is imperative that the reason for that is recorded. A comment such as 'very unstable hip stabilised by elective lengthening' will go a long way to ensuring your thought process is clearly documented and will reassure you and your patients, as well as the legal teams, that appropriate steps to avoid LLI have been taken.

The Sir John Charnley Lecture – Professor Henrik Malchau

Review by Mr Jonathan Howell

This year's Sir John Charnley lecture, entitled "Forty years' experience of a National Registry – Clinical Improvement and research potential" was given by Professor Henrik Malchau, who began his

posing the question "How did it all start" he re-introduced to the audience his seminal PhD thesis¹ on the stepwise introduction of novel implants. This concept of a progression from pre-clinical testing before human implantation, introduction to clinical use through randomised trials, further assessment through retrieval analysis and



lecture with his own personal connection with Sir John, having revised one of Charnley's hip replacements, which Henrik has retained to this day.

Professor Malchau followed that by taking us back to where his medical career started, and in particular to his elective period as a medical student, which he spent in Botswana carrying out a prophylactic healthcare programme for Kalahari tribes. He wrote his first scientific paper as a result, on the prevalence of tuberculosis among the Kalahari people. In

finally monitoring of performance through national registries endures to this day. In a link to his earlier slides he noted that a national registry of joint replacements had been proposed by Charnley in 1972, though it didn't come to fruition in this country until some time after that!

Professor Malchau then continued with a number of thoughtful reflections on the development, uptake and evolution of registries and their place in past, present and future orthopaedic practice. He reviewed the uptake in registries around the

world, from early national registries in the Nordic countries through their being established in Australia, New Zealand, Canada and in England, Wales and Northern Ireland. He expressed his hope that we could “paint the whole world red” and collect registry data wherever joint replacement surgery is practiced, linking registries to create ever more powerful datasets.

The argument for reporting the results from registries in the public domain was made, while acknowledging the multiple challenges that arise from doing so.

Professor Malchau argued that “nobody wants to be worst in class” and that publication of registry findings will lead to implementation of best practice but he was careful to point out that the data published must be of high quality and valid, discussing ways in which data quality can be assessed and assured.



Looking beyond the assessment of implant failure, he reviewed the evolution of registry data into the collection and analysis of patient reported outcomes, something he passionately endorses. He argued that there is a clear difference between the results obtained from measuring implant failure and the experience of the patients living with prostheses and hence the profession must put the patients’ experience at the centre of registry data collection.

Professor Malchau then turned his attention on the orthopaedic profession to examine

whether surgeons’ practices reflect the results of the national registries. He reviewed his paper from 2013², which had concluded that there was a paradox between surgical practice and the findings in registries but he also announced the submission of a follow-up paper which has found evidence that practice may now have changed to be more in line with registry results.

The final aspect of registry function that he reviewed was the role of registries in implant benchmarking. He praised the work of the Orthopaedic Devices Evaluation Panel (ODEP) and that of Beyond

Compliance but he feels that there is room for improvement, challenging the profession to take benchmarking global; from ODEP to GLODEP. He exhorted the worldwide orthopaedic community to come together in registry collaborations that would take registry function to the next

level and to bring this wonderful lecture to a close he invited all present to join him at next year’s meeting of the International Society of Arthroplasty Registries in Adelaide.

1. On the importance of stepwise introduction of new hip implant technology : assessment of total hip replacement using clinical evaluation, radiostereometry, digitised radiography and a national hip registry. Malchau, H. *Ortopedisk kirurgi, Göteborgs universitet* 1995. ISBN 91-628-1658-6.

2. A Review of Current Fixation Use and Registry Outcomes in Total Hip Arthroplasty: The Uncemented Paradox. Troelsen A et al. *Clin Orthop Relat Res.* 2013 Jul; 471(7): 2052–2059.

Non-Arthroplasty Hip Surgery Revalidation

The session started with an overview of the 4th Annual Report of the Non-Arthroplasty Hip Registry (NAHR) which was released at the BOA meeting and is available to download at www.nahr.co.uk. Mr Vikas Khanduja presents his overview of the report below.

Summary of 4th Annual NAHR Report – Mr Vikas Khanduja



The NAHR continues to grow year on year with more than 2,000 cases contributed in 2018 (Figure 1) and with over 10,000 total procedures recorded in the registry to date; this includes 5,212

arthroscopies for FAI, 444 arthroscopies for extra-articular pathology, 896 PAOs and 98 femoral osteotomies. Surgeons are able to enter data retrospectively and we are grateful to those who upload their historic data which has led to a further increase in contributed cases particularly in the last 2 years. 2018 also saw record numbers of surgeons (67) contributing data to the registry.

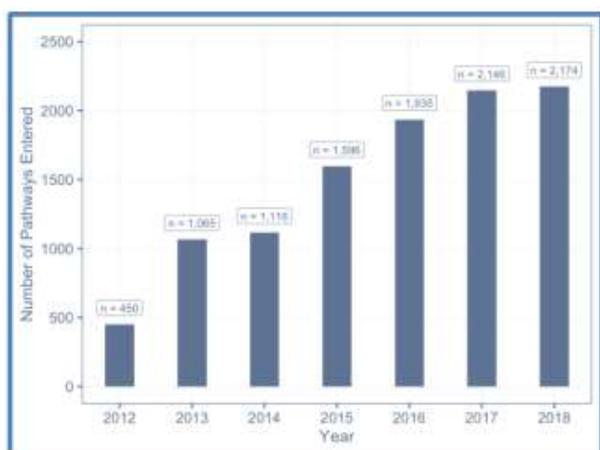


Figure 1 Pathways uploaded per year

Work continues to improve the of return of post-operative outcome questionnaires although 2-year return rate remains too low to draw reliable conclusions for the majority of procedures.

With the maturity of the dataset continuing to grow, several projects have now been completed examining the effectiveness of our surgical interventions and are nearing publication:

1. PAO for DDH & FAI

Our first study reports the outcomes for 630 patients undergoing a PAO for either DDH (89%) or FAI (11%). EQ-5D Index and iHOT-12 scores were reported up to 2 years post-operatively.

For both pathology groups there was significant ($p < 0.05$) improvement recorded between the pre and post-operative scores maintained up to 12 months by which time almost 90% of patients had achieved the minimum clinically important difference (MCID) in iHOT-12 score (improvement ≥ 9). This study is one of the largest cohorts of PAOs reported to-date.

2. Arthroscopy for FAI

Secondly, we present outcomes for a cohort of almost 4,000 patients who underwent arthroscopic treatment of FAI. Patients were classified according to pathology into three groups dependent upon the index procedure performed for FAI which comprised: 1) “Cam”: excision of cam lesion, 2) “Pincer”: excision pincer lesion and 3) “Mixed”: excision of both a cam AND pincer lesion.

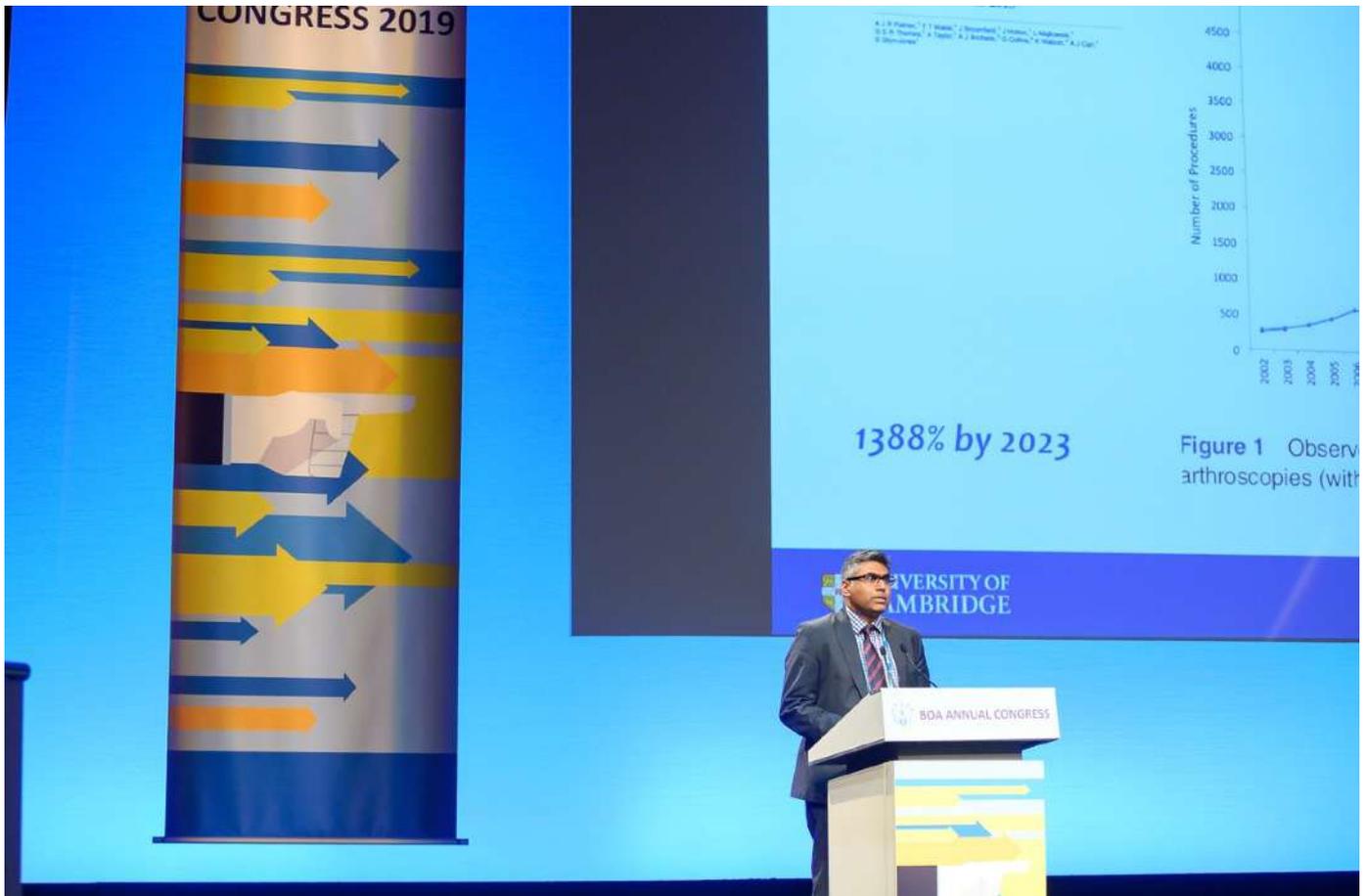
Overall, for the entire cohort, there was significant improvement in six and 12 months patient outcomes compared to pre-operative baseline. Approximately 65% of patients maintained the MCID (iHOT 12 improvement ≥ 13) up to 12 months.

NAHR Progress

Meanwhile the NAHR User Group has been extremely busy behind the scenes to ensure we keep our dataset up-to-date and relevant. The Minimal Dataset has been updated to Version 2.0 which now includes extra-articular procedures and labral

surgery of the hip and to further improve the quality of hip surgery in the UK.

We now have a dedicated website www.nahr.co.uk which gives both surgeons and patients access to the philosophy of



reconstruction. We have also revised the Consent form keeping it in line with the new GDPR guidelines. Finally, the individual Consultant dashboard has also been revised to ensure that it becomes more relevant and reliable for the appraisal process.

Issues related to surgeon and patient compliance continue to haunt us and the NAHR User Group is working tirelessly with the BHS and BOA to address these issues and there is no doubt that making data entry mandatory in some form is around the corner! Our main focus remains to monitor the outcome for patients undergoing non arthroplasty

NAHR and the annual reports can be downloaded as well.

On the whole, it has been a great year for the NAHR; the dataset is beginning to mature and crossing 10,000 procedures on the registry is a truly remarkable feat.

Non-Arthroplasty Hip Surgery Revalidation – Case Based Learning

This revalidation session specifically covered the management of hip pathology treated by non-arthroplasty surgery. The format of the session was problem-based learning via case presentation format that covered the spectrum of young adult hip disorders that can present to us as orthopaedic surgeons. The learning objectives of this session were to inform and update surgeons on the assessment, investigation and treatment of the more commonly occurring non-arthroplasty surgical conditions and potential solutions.

Femoro-acetabular impingement Cam deformity Mr Jon Conroy



Jon presented a case involving a young patient (23 years) with late presentation of hip pain due to cam deformity.

Pre-op history included a three-year history of groin pain, initially

worse with exercise only. The patient presented with increasing rest pain affecting his job and daily activities. Physical examination was consistent with impingement with reduced internal rotation in flexion. Radiographs showed a cam and no evidence of osteoarthritis

Investigation included an MR Arthrogram which revealed a large cam with an alpha angle – a measure of femoral head sphericity – of 72° (normally less than 55°), a labral tear and no significant articular damage. The patient was reviewed in clinic six months following imaging.

Risks and benefits were explained to the patient and hip arthroscopy was performed. At the time of surgery significant delamination of the acetabulum was noted. A microfracture was performed along with labral repair and a femoral osteochondroplasty. At two years post-operatively, the patient has returned to work in an office but unable to return to semi-professional football.

Jon outlined the learning point from this case was to consider early surgical intervention in young active patients with a large cam lesion. Often these patients can tolerate articular damage with minimal symptoms. There is evidence that delaying surgery more than two years after the onset of symptoms is detrimental to outcome. More recent reviews have suggested worse outcome if surgery is delayed more than six months following the onset of symptoms.¹ The other important point is to review imaging in the light of deterioration in symptoms. In this case an up-to-date MRI may have been beneficial in the management of the patient. It is important to consider early referral of patients to a specialist in young adult hip surgery if initial non-operative management is unsuccessful.

1. Kunze, K. N et al. The American Journal of Sports Medicine (2019), 47(9), 2038–2044

Learning points

- Poor prognosis
 - Large cam lesion / alpha angle
 - Severity of symptoms
 - Time to presentation
 - Be wary of time from initial MRI
 - Consider early intervention to improve results

Hip Dysplasia Periacetabular Osteotomy Mr Callum McBryde



Callum presented a case of 38-year-old female with an 18-month history of progressive activity related and positional right groin pain not improved with physiotherapy. There were no risk factors for developmental dysplasia of the hip

(DDH) or history of childhood hip complaints.

Examination identified normal BMI, normal gait with a normal foot progression angle. There was slightly increased internal hip rotation on the right in comparison to the left hip with positive signs of impingement in the flexion, adduction and internal rotation (FADIR) position but also in deep flexion. External rotation was similar in both hips with no pain.

AP pelvis radiographs demonstrated borderline hip dysplasia on the right with a centre-edge angle (CEA) of 24° and an acetabular inclination (AI) angle of 13° with no other adverse features. CT scan of pelvis and knees revealed normal acetabular anteversion but increased femoral version of 48° on the right. Non-contrast 3T MRI of the hip with axial oblique views demonstrated anterolateral labral tear with no cam or chondral cartilage changes.



The diagnosis was one of labral tear with borderline hip dysplasia and increased femoral anteversion. Decision making took into consideration: the patient's age; that she had progressive symptoms not settled by conservative management; normal body mass index; no osteoarthritis; normal foot progression angle and radiological evidence of hip dysplasia.

The patient was advised to purchase a book "A guide for adults with hip dysplasia" and look at a Facebook group called Periacetabular Osteotomy (PAO) – a UK based group - and return to clinic to discuss options which included ongoing conservative management, hip arthroscopy, hip arthroscopy with pelvic osteotomy or pelvic osteotomy alone. Due to patients age (> 30 years) and normal foot progression angle it was decided not to offer a femoral osteotomy.

The patient was counselled that, on average, 80% of patients have significant

improvement in symptoms and an 80% risk reduction in likelihood of total hip replacement with a pelvic osteotomy. There is a risk of 5% of complications which were discussed in detail.

A pelvic osteotomy (BIPO - Birmingham Interlocking

Periacetabular Osteotomy) was performed successfully and without complication. The patient underwent routine removal of metal work as a day case at 12 months post-operatively. At 18 months post-operatively the patient was asymptomatic, fully active including regular attendance at a gym performing high impact activities.

The learning points of the case are to have a high index of suspicion in young females with recurrent hip/groin pain. Hip dysplasia should always be considered in this group and assessment of rotational alignment should take place. An AP pelvic radiograph

If diagnosis is made early then pelvic osteotomy is an extremely successful intervention in both the short term and in the published literature for up to 30 years post-operatively.



should be taken and in all cases the CEA and AI should be measured. If the CEA < 21 and the AI > 11 then hip dysplasia can be diagnosed when the CEA is between 21 and 28 then borderline dysplasia can be diagnosed and may be the cause of the patient's symptoms when the full picture is considered. CT (including full rotational alignment of the lower limbs) and an MRI (non-contrast, 3T) are essential in these cases.

Rotational Abnormalities and their effect on the hip

Mr Tony Andrade



As part of any examination of the hip, the range of motion of that hip should be assessed. In order to understand what could be affecting that range of motion it is important to be aware of

the affect of rotational abnormalities on the hip (see Figure 1).

These rotational abnormalities can lead to hip symptoms in cases where plain radiographs of the pelvis and hip do not show any morphological abnormalities. It is therefore essential to have a high index of suspicion for these, examine the hips for these and, if in doubt, obtain appropriate imaging to identify any such abnormality.

The gold standard imaging technique is a CT rotational profile assessment, which should include slices through the hips, the

knees and the ankles, so that abnormalities of acetabular, femoral and tibial version can be detected.

Femoral version is measured according to the method described by Murphy et al.¹ Tibial torsion is measured according to the method described by Kristiansen et al.²

The prevalence of femoral and acetabular version abnormalities in patients with symptomatic hip disease has been reported by Lerch et al.³ They reported that whilst 70% of their patients had normal acetabular version, only 48% had normal femoral version. 17% of their population had severe femoral malversion. The combination of femoral and acetabular retroversion is seen to occur in only 4% of their patients, and this would manifest as severely reduced internal rotation of the hip, with excessive external rotation of the hip.

In a review of CT rotational profile assessments for 100 hips in our own patients, we found that 58% had abnormal femoral version. In addition, abnormal tibial torsion was detected in 52% of cases, with severe tibial torsion (>50°) in 22%.

Even when assessing patients with femoro-acetabular impingement and labral tears it

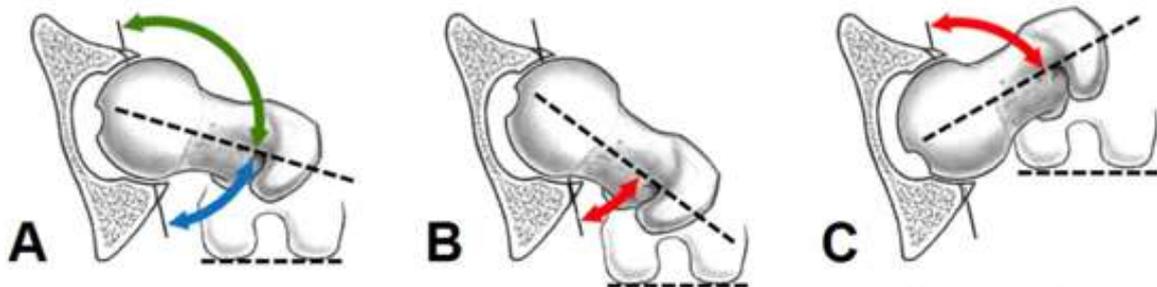
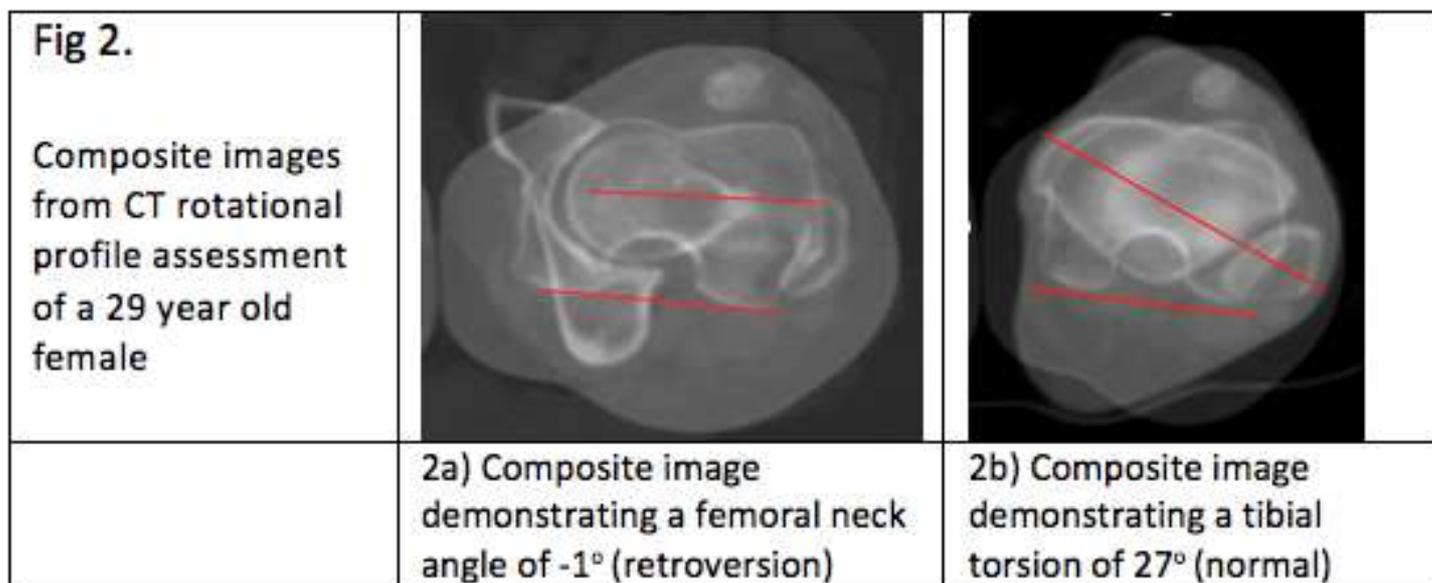


Fig 1.	A – Normal femoral version and normal range of motion	B- Persistent femoral anteversion resulting in reduced external rotation	C- Relative femoral retroversion leading to reduced internal rotation
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is important not to ignore these version abnormalities. Fabricant et al reported that when stratified by femoral version, the postoperative improvements in patients with relative femoral retroversion ($<5^{\circ}$ anteversion) were clinically important but of significantly smaller magnitude than those in the other version groups.⁴

In summary, the prevalence of femoral version abnormalities is particularly high in symptomatic hips. Tibial torsional abnormalities can also be seen in symptomatic hips with 52% having been detected in our series. Relative femoral retroversion ($<5^{\circ}$ anteversion) is associated with significantly worse outcome of FAI surgery than those in the other version groups. We therefore recommend rotational profile assessment for ALL patients with symptomatic FAI, or symptomatic hips where no obvious pathomorphology can be found on conventional radiographs.

1. Femoral Anteversion. Murphy S et al. J Bone Joint Surg Am 1987 Oct;69(8):1169-76
2. The Normal development of tibial torsion. Kristiansen LP et al. Skelet Radiol 2001; 30(9): 519-22
3. Prevalence of Femoral and Acetabular Version Abnormalities in Patients With Symptomatic Hip

Disease: A Controlled Study of 538 Hips/ Lerch TD et al. Am J Sports Med 2018 46(1):122-134

4. The effect of femoral and acetabular version on clinical outcomes after arthroscopic femoroacetabular impingement surgery. Fabricant et al. J Bone Joint Surg Am 2015 Apr 1;97(7):537-43

Retroversion of the Acetabulum

Mr Matt Wilson



Matt presented a case of acetabular retroversion with an unusual aetiology. A 13-year-old girl presented to the paediatric department with a history of hip pain interfering

with daily living. Of concern was a past history of rhabdomyosarcoma at the age of four years old, treated with surgical excision, chemo and radiotherapy. Initial imaging with plain films and MRI thankfully did not reveal any sign of recurrence only changes consistent with previous surgery and radiotherapy. After a failed course of physiotherapy the young lady was referred to paediatric orthopaedics and subsequently to the young adult hip service. The patient described activity related pain deep in the antero-lateral groin, worse when sitting compared to standing.

Examination revealed a stiff hip gait with a short left leg and a normal right hip. The left hip was painful in all ranges with flexion limited to 70°. There was no clinical suggestion of a femoral version abnormality but examination was difficult. Careful interpretation of plain films revealed a slightly rotated film. It is worth noting at this point that assessment of acetabular version on films with rotational changes in coronal or axial plains is challenging and it is wise not to draw too many conclusions, acetabular retroversion can appear with increased anterior pelvic rotation or lateral rotation to the affected side. In these cases, consideration should be given to arranging

additional, cross-sectional, imaging. CT scan confirmed a marked acetabular retroversion, probably due to growth abnormality secondary to the prior radiotherapy treatment.

A treatment algorithm was defined by Peters et al¹ and a review is available on open access.² Although acetabular rim trimming may be an option for some mild cases of acetabular retroversion with anterior impingement, the level of deformity in the case presented was such that this was not appropriate due to the amount of acetabular wall that would need to be removed. Steppacher et al demonstrated that there is no increase in acetabular surface area in retroversion and Bhatia demonstrated that acetabular rim trimming reduced the overall surface area for bearing weight leading to a consequent increase in

Treatment – Acetabular Retroversion



load stress. Therefore, in this case an anteverting peri-acetabular osteotomy was considered the only surgical solution. In a small series Siebenrock et al reviewed the result of this operation at 10 years post-operatively.⁵ They reported a 14% revision rate and noted that over and under correction were the biggest risk factors, indicating the fine margins of correction that

need to be considered in this challenging surgery.

After careful counselling and consenting, the patient underwent an anteverting PAO and at six months post-operatively, is progressing well. Although still suffering some discomfort related to her hip anatomy, the young lady is much improved and in a better position to cope with the other challenges facing her at present.

1. An algorithmic approach to surgical decision making in acetabular retroversion. Peters C et al. *Orthopedics* 2011 vol. 34(1):10
2. Acetabular Retroversion – Diagnosis and Treatment. Direito-Santos B et al. *EFORT Open Reviews* Vol 3, No 11
3. Size and shape of the lunate surface in different types of pincer impingement: theoretical implications for surgical therapy. Steppacher SD et al. *Osteoarthritis Cartilage* 2014 22(7):951-8
4. Effects of acetabular rim trimming on hip joint contact pressures. How much is too much? Bhatia S et al. *The American Journal of Sports Medicine*. 2015; 43(9), 2138–2145.
5. Anteverting periacetabular osteotomy for symptomatic acetabular retroversion: results at ten years Siebenrock K et al. *J Bone Joint Surg Am*. 2014; Nov 5;96(21):1785-92

Perthes' disease Acetabular and femoral osteotomy Mr Ajay Malviya



Ajay presented the case of a 20 year-old with a history of hip pain for two years. She had Perthes' at the age of six which was treated non operatively. On assessment she had right leg

shortening of 3 cm, a positive 'gear stick sign' suggestive of trochanteric impingement and a positive Trendelenberg test. Radiographs and CT scan suggested acetabular dysplasia, trochanteric impingement, femoral head asphericity and femoral neck shortening (Figure 1).



Figure 1



Figure 2

The patient underwent a periacetabular osteotomy for the acetabular dysplasia, a valgus osteotomy along with sliding osteotomy of the femur to give her length and relieve the trochanteric impingement (Figure 2). At two year follow-up she showed good improvement in the functional scores.

Patients with Perthes' have both acetabular and femoral problems which need to be addressed. It is important to assess clinically and radiologically to establish the morphological abnormalities that need to be dealt with. Quite often patients need an examination under anaesthesia and arthrogram to assess congruency and impingement. The impingement can be intraarticular caused by an aspherical femoral head with cam lesion or extraarticular caused by the overriding trochanter. The strategies for dealing with these may vary and will depend on individual circumstances.

The acetabular dysplasia can be addressed by a periacetabular osteotomy to improve containment. On the femoral side the management depends on the sphericity of the femoral head and presence of intra or extra articular impingement. In the presence of a combined intra and extra-articular impingement (which perhaps is the most common scenario) a viable option would be to address this with open surgical hip dislocation with femoral head reshaping and trochanteric distalisation¹. If there is purely an intra-articular impingement, caused by femoral head asphericity, leading to a cam lesion the procedure can be performed arthroscopically. If there is only extra-articular impingement patients can have a trochanteric distalisation or indeed a valgus osteotomy if the leg is short. The valgus osteotomy can be combined with sliding osteotomy in the presence of a large leg length discrepancy, as was demonstrated in the case example discussed. If the femoral head is irregular, especially in the intra-articular region the role of hip-preserving surgery becomes debatable, although there are small case series of patients having femoral head reduction osteotomy with acetabular osteotomy^{2,3}.

In summary there are hip preservation options for patients with Perthes' disease that can possibly be explored for young

patients where arthritic changes haven't yet developed.

1. Does surgical hip dislocation and periacetabular osteotomy improve pain in patients with Perthes-like deformities and acetabular dysplasia. Clohisy JC et al. Clin Orthop Relat Res. 2015 Apr;473(4):1370-7.
2. Head reduction osteotomy with additional containment surgery improves sphericity and containment and reduces pain in Legg-Calvé-Perthes disease. Siebenrock KA et al. Clin Orthop Relat Res. 2015 Apr;473(4):1274-83.
3. Concurrent femoral head reduction and periacetabular osteotomies for the treatment of severe femoral head deformities. Clohisy JC et al. Bone Joint J. 2018 Dec;100-B(12):15



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