■ FORUM DISCUSSION

Hip and knee arthroplasty 2011

WHAT'S NEW, WHAT'S TRUE, DOES IT MATTER? EVIDENCE BASED ISSUES

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This conversation represents an attempt by several arthroplasty surgeons to critique several abstracts presented over the last year as well as to use them as a jumping off point for trying to figure out where they fit in into our current understanding of multiple issues in modern hip and knee arthroplasty.

Paper 1: Factors that influence patient selection of surgeon and hospital for TJA – Bozic KJ, Kaufman D, Chiu V, Caminiti S, Lewis C¹

Dr Rosenberg: Our first study was presented at the AAHKS meeting in the fall of 2011, and represents the work of Bozic, Chiu, Kaufman, Caminiti and Lewis, and is entitled 'Factors that influence patient selection of surgeon and hospital for TJA'. This study evaluated 251 patients with arthritic hips or knees, trying to figure out how it was that they decided to go to a particular hospital or a particular surgeon to have a total joint replacement. This study found the factors, in decreasing order of importance: physician manner (4.68), physician quality (e.g., outcomes) (4.64), hospital quality (4.01), physician reputation (4.00), customer service (3.98), physician qualifications (3.97), and finally non-clinical features (3.50).

So in terms of your own practice, your own development as a surgeon, and your own sense of how the marketplace functions and how patient's perceptions fit in to that, let's start with Tom Minas. Tom, is anything on this list a surprise to you, or does all this make perfect sense in terms of how your practice has developed over the years, and why people come to your institution or to see you?

Dr Minas: I would actually agree with these findings. The one thing that's hard to teach a resident, especially when they don't come to your clinic, is the importance of bedside manner, so even though you have all these other important, actually very important variables, those are right at the top of the list. And it should not be a big surprise because we are in the business of caring. So I think physician manner and behavior is really important.

Dr Rosenberg: I would agree with that as well, though I was surprised that physician reputation was fourth in importance. I mean, my impression has always been that it's at the top, because when I ask patients, that's the impression I seem to get, but maybe they're just sort of trying to meet my ego needs! Dr. Berend, does anything strike you as unusual in these results?

Dr Berend: I think it was unusual that technology didn't make the list, which I guess means that we have to be nice more so than to be a technician.

Dr Rosenberg: Well, I guess the question is, was technology on the list? How many people are under the impression that technology is what's driving patients to you?

Dr Della Valle: I think occasionally it does. There are certain patients who get hooked on one idea, and they kind of look for a surgeon who has that ideology.

Dr MacDonald: I think the results of this type of survey may depend on where you do the poll as well, because, for example, in the Canadian healthcare system, access would be high up on that list, because some of us have a year waiting list and some people have a month, and so that globally I think that variations in health care systems might provide some different numbers.

Paper 2: Discordance in TKA expectations between patients and surgeons – Ghomrawi HM, Mancuso CA, Westrich GH, Marx RG, Mushlin AI²

Dr Rosenberg: Here is a study that looks at patient expectations and the difference between the expectations of the patients and the surgeons performing a total knee arthroplasty, presented at the AAHKS meeting in

November of 2011, and was done by Ghomrawi, Mancuso, RobeMarx, Bostrom, Westrich, Mayman, and Mushlin at the Hospital for Special Surgery. Entitled 'Variables predictive of discordance in TKA expectations between patients and surgeons', they reported on 210 patients undergoing TKA who had completed a validated recovery expectations questionnaire pre-operatively. The questionnaire addressed expectations of post-op pain relief, function, and well-being. The surgeons completed the same questionnaire before each surgery, blinded to their patients' response. The surgeon's scores were compared to their patient's expectation scores, and using validated criteria, patients were considered to have discordantly high expectations if their scores were 7 points higher than the surgeon's. The effect on discordance of age, gender, education, comorbidity, BMI, and patient-reported SF-36 and WOMAC scores was estimated using generalised estimating equations. Patients had an average expectation score of 78 +/- 18, and over a third of the scores were qualified as being discordant with what the surgeon thought he could achieve. That is, one out of three patients had "unrealistic" expectations in comparison to the surgeon. Patients were more likely to have these high expectations if they were older than 65, if they filled out the survey before they had a pre-op education class (which they all went through) or if they had increased comorbidities, which I thought was somewhat surprising. Tom Minas, does this make sense to you in your experience, and are these findings important enough for us to change our practice patterns?

Dr Minas: Yeah, I think this does make sense; in my practice this would not be a big surprise because I treat so many young arthritics, and most of my total knees are under the age of 60, and they're a very demanding group. And I find that the more highly educated you make them before surgery, the more likely they're going to have a realistic outcome. Because a lot of them come in, and they think they're going to start running and playing sports, and that they're going to have a normal knee and that the total knee is the end of all their problems, whereas ...

Dr Rosenberg: It's not.

Dr Minas: It's not, it could just be the beginning.

Dr MacDonald: It's a bit surprising that the over 65 year olds are the more discordant, but you think through it and perhaps their actual scores are not any higher, their expectation is; the surgeon expectation may be lower for that patient cohort, so the difference is larger.

The other thing I was thinking is, it would be nice to see if this correlated at all; does the larger discordant score correlate to patient dissatisfaction or satisfaction? Because at the end of the day if they're equally satisfied, even if they're discordant, it's probably not as big a deal unless there's dissatisfaction.

Dr Rosenberg: Yeah, and these are all pre-operative findings, not post-operative, so post-operative discordance would be an interesting subject to study next.

Dr Berry: There has been research showing that if they have pre-operative discordance, they're more likely to be unhappy afterwards. So I think you can make that link a little bit. To me the thing that stands out about this study is actually the value of pre-operative education, because that's how we can influence to some degree whom we choose to operate on and what their results maybe.

So to me it says that if you do a good job of talking to your patients before surgery, give them realistic expectations, and don't treat joint replacement like a commodity where everybody is just automatically going to do well, the chance of having good results are going to be better. At least giving people a realistic expectation about what they might achieve.

Dr Rosenberg: What percentage of patients do you think come into your office with dramatically unrealistic expectations for function or recovery? Just across the panel give me a number. 5%? 10%? 0%? Craig?

Dr Della Valle: I'd say in my practice about 10%.

Dr Rosenberg: Dan?

Dr Berry: Same, 10%.

Dr Rosenberg: Steve?

Dr MacDonald: Low. 5, 10.

Dr Berend: I think it's higher. I think patients base it on recent less invasive, this is quick, go home the next day, outpatient, all the stuff that we've trained them to think about. I think they don't have a realistic expectation from the procedure, and education is the key.

Dr Rosenberg: Tom, any difference?

Dr Minas: I agree with Mike. I think it's quite high and I think it's very much age dependent too. I think the younger the patient, the more unrealistic their expectations.

Dr Rosenberg: Well, let me ask this question then: how many people use a classroom setting with multiple patients, everyone gets educated at the same time? Raise your hand if that's what you do (*three hands raised*). See, I don't do that because I think that every case is different enough in terms of the patient's ability to understand, and the degree to which they are eager to assimilate detail.

Dr Berry: So Aaron, I just say that's one element of what we do, but not the only thing we do, so I think there are helpful things to do in that setting, but you have to do more than that on a personal basis. It's not sufficient, but it's helpful.

Dr Rosenberg: How many people does it take to do the job of educating the patient? How much of the education is group or class, and how much is one on one and who does the actual education?

Dr Della Valle: Oh, yeah. I mean, I think the class does a lot.

Dr Rosenberg: You think it's 50/50?

Dr Berend: We give them a book, we give them a DVD. I go through it with them. They're so blown away when you tell them they need a joint replacement, I think they stop listening, and so giving them multiple media outlets to understand it I think is critical.

Dr MacDonald: Yeah, we're the same. We have a book, we have a website. We don't do classroom where they come in. When they come in for the pre-admit, that's when they get individualised. We don't do a classroom.

Paper 3: Total joint arthroplasty: should patients have preoperative dental clearance? – Sharkey PF, Lampley A, Huang R, Parvizi J, Arnold WV³

Dr Rosenberg: Speaking of pre-operative stuff, here is a study that reviews dental clearance studied out at the Rothman Institute and presented at the Hip Society in 2011, looking at pre-operative dental clearance data collected from 189 patients undergoing total hip replacement and 169 going total knee replacement. This was done by sending the patient to the dentist to evaluate the need for intervention to clean up the oral cavity prior to surgery. And they prospectively followed these patients to determine whether or not there was post-operative infection and what organisms caused it.

They compared that data to 219 patients that required total hip for emergent fracture and didn't undergo dental clearance prior to surgery, who were retrospectively reviewed as a comparison group. They found that 30 of 358 elective patients, or a little under 10%, required dental treatment prior to surgery. They found nine superficial and five deep infections with various organisms, none of which were oral flora. The hip fracture group had three I&Ds and one resection for periprosthetic fracture that was also infected. But all the cultures in the hip fracture group were negative.

Their ultimate finding was the rate of infection was 1.3% in the elective group *versus* 1.8% in the hip fracture group and their conclusion was that dental clearance was not an important part of preoperative surgical care. Let's start with Dan Berry, please give us your thoughts.

Dr Berry: So I know the point isn't to be too critical of the papers, but this to me is a paper with a sexy title but insufficient data to really come to the conclusions which are drawn, because it's underpowered for the outcome which you're interested in, which is infection. You know, if you've got a group of 30 patients, and their case control series, it really isn't enough to tell you. So they may very well be right. I think we might even suspect that they're right, but I don't think the numbers are high enough to hang our hat on for the future.

Dr Rosenberg: And so what do you do? Do you tell patients to go to the dentist before or do you just ask them 'do you have any problems?'

Dr Berry: Well, I have a look at their mouth quickly, and if there seems to be a really big problem, then we'll have them go to the dentist and get looked over. That's, you know, a fairly small minority of our patients, honestly.

Dr Rosenberg: How many people look in the oral cavity?

Dr MacDonald: You look in their mouth, Dr. Berry? Is there anybody from the Mayo Clinic who's ever worked with Professor Berry in the audience?

Dr Berry: If we look at somebody and their dentition's clearly a major problem, and you see them in the office, you usually can pick up on that I think when you're

having a conversation with a patient. No, I don't do a detailed dental exam.

Dr Rosenberg: They're spitting their teeth out of their mouth, yeah.

Dr MacDonald: My test is, yes, if a tooth doesn't drop on the floor while I'm examining their hip or their knee, then to me that clears the Canadian Dental Association quality test.

Dr Berry: Actually, I thought in Canada if they had teeth, they cleared it?

Dr Rosenberg: Anybody do any different on the panel? Anybody take this seriously? Not really. Okay.

Paper 4: Does preoperative patellofemoral joint state affect medial unicompartmental arthroplasty survival? – Berend KR, Lombardi AV Jr, Morris MJ, Hurst JM, Kavolus JJ⁴

Dr Rosenberg: Here's a series presented at the 2011 Knee Society representing a large number of consecutive mobile bearing medial uni-compartmental knee replacement from New Albany, Ohio. One thousand knees in 808 patients over a four-year period. The average age was 63, ranging from as young as 30 to as old as 90. Average BMI was a little on the heavy side, 32.3. A total of 68% of the patients had isolated medial pain pre-operatively, which means that about a third didn't, they had something other than isolated medial pain.

So I'm not sure how to interpret that in terms of the rest of the data, but at 38 months average follow-up, three years essentially, there were 40 revisions. There's a three year survivorship of 96%, which is what I would expect to have in a total knee series at 15 years or so. So this was kind of a shocking number. The individual causes for revision here were loosening, 11 on the tibial side, one on the femoral side, and four on both, for a total of 16. The tibia collapsed in six. So 22 were either loose or collapsed. There were nine who had persistent pain, which is a reasonably high number, three dislocations and one infection.

So I bring this up because of the data that's been showing up in the past couple of years or even months. One is a series from the Mayo Clinic that I don't have the data on, that Rafael Sierra has been promoting that shows that the clinical results of revision for uni-compartmental knee arthroplasty produce knees that are about the equivalent of revision total knees, which is kind of surprising because we've all been promoting, those of us who do uni's, that revising is kind of like doing a primary, but it turns out that the results from the Mayo Clinic don't support that, and now we've got this study.

Paper 5: Unicompartmental knee arthroplasties revised to total knee arthroplasties compared with primary total knee arthroplasties – Rancourt MF, Kemp KA, Plamondon SM, Kim PR, Dervin GF⁵

Dr Rosenberg: This paper sheds some light on what happens when the uni-compartmental knee replacement

fails and must be revised. Certainly an important consideration in the choice to perform the operation in the first place. Presented at the AAHKS meeting in 2011 by Rancourt, Plamondon, Kemp, Kim, Dervin, who reviewed 48 failed uni's which were revised to total knees, and then retrospectively matched to a control group of primary total knees during the same period with a two to one propensity score for age, sex, BMI, and follow-up time. These knees were then all followed two to six years using outcome measures of objective peri-operative and operative data as well as using the WOMAC as an outcome score.

They found that the mean post-op hemoglobin drop and length of stay were similar between groups, but the uni group had more stems, augments, larger tibial inserts, and longer tourniquet times. The mean uni revision WOMAC was a 30, and the control group was 20. So the uni's had significantly less satisfactory results in all sub-categories. Dr. Della Valle, your thoughts.

Dr Della Valle: This was a good study and I discussed this paper with the authors after their presentation. What I thought they really needed to do, though, was compare primaries to revisions, uni's to primaries, and HTOs to primaries to understand the differences, because I don't think it's surprising that the uni's required more stems than a primary knee, but what they didn't compare was a conversion or a revision of a primary knee to a revision knee.

So, I mean, they don't really have a comparative group, I think, that's a fair comparator. And I think most of us probably think it's maybe somewhere in the middle.

Dr Rosenberg: Yes, while the study isn't perfect in the sense that it doesn't compare all of the possible groups it might be compared against, I would say this: UKA revisions are simpler than most TKA revisions, but at the end of the day the quality of the result is frequently closer to revision surgery in many cases, than to primary.

Dr Della Valle: It may be the case, I just don't know we can say that based on their data.

Dr Rosenberg: My impression, having done a lot of these is the question that is raised by this and by the previous study, given their pretty high failure rate, and given the fact that Gerry Engh has told us that there's probably about a 1.6% revision rate per year following UKA, which means that at five years you may be looking at 8 or 9% requiring revision. And the results are not as good when you just start off with a primary TKA. Shouldn't we just be doing primaries in these patients? Rafael Sierra has recently presented similar data from the Mayo Clinic, that shows that the assumption we've been laboring under, which is that revising a uni's no problem; if they fail, you revise them, and they're just like doing a primary is not the case. And when you say to Rafael, well then based on similar data to that presented in this study, "are you're doing less uni's?" "he says, no.

Dr Della Valle: Well, I think what Rafael's study showed is that we need to take it more seriously. I think

what he suggested is that we should probably be using some type of stem more commonly than we do. You know, his point was these were done by expert knee surgeons, and when primary components were used, there was a higher than expected rate of failure. So I think what I got away from the message was that you should be considering the use of stems more liberally in those revisions.

Dr Rosenberg: Does anybody take these papers and this data to decrease the number of uni's they're doing, to be more stringent in their indications? Steve?

Dr MacDonald: Well, you can't decrease lower than 0%, I don't do uni's. But that being said, I think if you look at this data, it makes sense. I mean, it does make sense, right? I mean, obviously there's chipshot uni conversions, and then there's ones where the tibia's sunk down, you need to stem it. Often you don't have to stem the femur because that's fairly protective. I will say, though, that you should be thinking long and hard why you're not putting a tibial stem on a failed uni case. I mean, it almost should be routine, at least in my hands, and the way I'm training my residents and fellows.

Dr Minas: I'm just looking at this uni study, and I'm a little bit surprised, and I think nearly always the conversion problem is on the tibial side. The femoral side is not a big issue, especially with this implant because it works off the tibia, and it takes more bone away from the femoral side. So I'm a little surprised that there was 11 tibial components which demonstrated subsidence, frankly, because this is such a conservative operation on the tibial side.

Dr MacDonald: There's a thousand cases, so still the percent is low. But this uni has an 86% track record, which is a good track record for uni's, and they're showing the registry at 10 years, 86% survivorship, but it's nowhere near a total knee.

Dr Rosenberg: None of them are.

Dr Della Valle: And I guess the other thing is, have they seen a change over time? And Mike may know the data better, but I'm assuming that this includes their initial experience?

Dr Berend: Yeah.

Dr Della Valle: And I think my perception from seeing them present this data is that as they've gotten more experience, both in patient selection and surgical technique that the failure rate has decreased.

Dr Berend: I think surgical technique, patient selection, doing the operation well and getting beyond 50 or a hundred cases, I think the revision rate has gone down. I think we can't forget that although survivorship may be higher early on for total knee, patient satisfaction most likely is not, and I think the morbidity of the operation, the multicenter study we just finished, showed the early complication rate was two-fold higher for total knee, when those patients would not be revised for pain or other early problems. So manipulation, bleeding problems, infection, long term range of motion and stair climbing all favor partial

knee replacement. So for me, this data only leads to doing more partials rather than less. How's that for backwards?

Dr Della Valle: Dr Rosenberg, if we look at our own institution and we look at the survivorship of our uni's and totals done at the same time, it's pretty much a dead heat at 20 years. Granted there was some problems with those total knees done in that era, but...

Dr Rosenberg: but a much more dramatically restricted indication. I mean, the interesting thing now is the indications are very broad across the map, if you take a look at the rate at which many surgeons are doing them.

Dr MacDonald: Well, I feel the need to emphasise that for UKA's like some other procedures, it's going to be surgeon dependent. If you look at national registry databases, none of them show equal survivorship, and the driver to revise a uni is 10% undiagnosed pain. So there are multiple reasons. These authors represent two surgeons doing a thousand cases over four years. That's going to be different than somebody doing 20 total knees a year and then trying to decant out one or two or three UKA's a year.

Paper 6: Open surgical dislocation for the treatment of femoroacetabular impingement: past, present, and future – Peters CL, Stronach BM, Pelt CE, Erickson JA⁶

Dr Rosenberg: So let's now move on to the patient specific instrumentation. I thought this was a very clever study done by Chris Peters presented at the closed meeting of the Knee Society in 2011. He evaluated 66 knees in 60 patients with patient specific instruments to see if the surgeon had to intervene to improve positioning or sizing intra-operatively. He found that the PSI guides fit poorly on 12 percent of the femurs and five percent of the tibias, and that pre-operative planning predicted the appropriate femoral size in only 23 percent with one of the femoral components requiring upsizing but the remainder, close to 75% required downsizing. Tibial size was predicted correctly in only 50%, requiring upsizing in 36%. Furthermore, the tibial resection was abandoned for an EM guide in five of the 66 knees because the tibial resection appeared to be inappropriate in terms of its position. On average there were 161 surgeon-directed corrections or 2.4 needed per knee. Only three knees required no intra-operative changes. The most frequently required changes were; increasing the distal femoral resections (30%), internally rotating the femoral cutting block to get rotation correct (18%), increasing the amount of tibial resection (25%), and increasing the valgus angle of the distal femoral cut (14%).

In this sort of setting where the surgeon is very experienced, and the PSI is promoted as making the operation easier for people who don't have as much experience to get all the cuts right, and he's had to make all these changes, what are the ramifications? In this series, 50 femoral components were downsized, and there was still

notching in eight out of 66, and 24 of the tibias were intra-operatively upsized from the pre-operative plan, with no resulting radiographic overhang. What's your impression from this data? Tom?

Dr Minas: Well, you have to use all your senses about you. I mean, I don't think there's any jig system that will take away from a thoughtful assessment. You can't just put a jig and just do your cuts. I think you have to use all your judgment with these devices.

Dr Rosenberg: So if you don't have a lot of judgment to begin with because your experience level is low, do you think there's more of a tendency to follow what the guides show you and so get you in trouble? Mike?

Dr Berend: Yeah, I think you've got to be careful. I also think we don't know if the outcome would have been compromised if they had not made any of the changes. So it's concerning when you have to make a lot of changes, but we don't necessarily know that it's detrimental if we don't make the changes for this type of system.

Dr Rosenberg: I would guess it's detrimental in most cases. If I look at something and don't like it, I'm making it better, not making it worse. I have a certain amount of faith in my own judgment, but then again maybe it's not warranted.

Dr MacDonald: Seems like a very expensive jig system really if you think about it. What he's showing is that in this particular technique, the way he was doing it is that he had to continue to change it. Now, Mike's point, we don't know for sure had he left it. I think the 30% distal femoral resection and increased tibial resection, that's a pure balancing issue, so that doesn't mean the jigs necessarily were wrong for alignment. Right? I mean, because we have to tweak that all the time depending on the soft-tissue balancing. But changing the angles and internally rotating the femoral cutting block is a bit odd, quite honestly.

Dr Rosenberg: Are either of you using patient specific instrumentation?

Dr Berry: No, I'm not using it, but I will say I think the important point of this paper is that you've got an experienced surgeon who's tried the state-of-the-art technology and found that he needed to keep tweaking it to be perfectly happy, which says that at least as the technology existed that he used, you can't just turn off your brain and blindly follow this without knowing the rest of how to do the operation. We're not at that stage yet.

Dr Rosenberg: Tom, final comment?

Dr Minas: Yeah. I was just going to say I'm not sure, I don't know the system, whether these jigs were CT guided or MR guided, but there's a real difference, because the problem is with an MR guided system, you don't really know where the subchondral bone is because you've got the calcified zone of cartilage and then the subchondral bone, and the calcified bone can be 2 or 3 mm, and that's two or three degrees right there. So there's a lot about what the guides are based off of and

what you're going to be cutting off of that we still are working on.

Paper 7: No benefit of minimally invasive TKA on gait and strength outcomes: a randomized controlled trial – Wegrzyn J, Parratte S, Coleman-Wood K, Kaufman KR, Pagnano MW⁷

Dr Rosenberg: This next study headed up by Mark Pagnano at The Mayo Clinic was also presented at the closed meeting of the Knee Society in 2011. He randomised 40 total knees to either a mini-subvastus or standard approach. He did all the surgery himself, and then had the patients and the evaluators blinded as to what operation they had. The groups were dynamically balanced based on age, sex and BMI. They then measured peak isometric knee flexion and extension strength, and did a comprehensive gait analysis during walking and stair climbing pre-op and post-op at both two months and at two years. And except for a higher speed during stair ascent two months after surgery in the MIS group, there was no difference in the Knee Society scores, quadriceps strength or gait parameters.

Where do you put this in the perspective of our current enthralment with MIS or our what seems to our change from enthralment to routine use of shorter incisions? Tom?

Dr Minas: There's no big surprise to me. I've tried mini quad split, subvastus, midvastus, and the only difference I see in my practice is the early improvement. But once you get out a few months, I don't really see much difference at a year clinically.

Dr Rosenberg: Anybody have anything different to report or comment on?

Dr Della Valle: I think in the milieu of all the things that we've changed in terms of peri-operative management, the approach probably has a very small effect that is probably washed out by all the other things that we do to make the patient experience better early post-operatively.

Dr Berry: I just think this emphasises the importance of keeping your priorities straight in surgery. Your priority is to see what you're doing and do a good job of the main operation, and whatever effect there is of length in incision or these minor differences in operative approach are probably small compared to the importance of doing a good job with the other part of the operation.

Dr Rosenberg: So do you think that the patients coming in looking for that specific feature, that's a result of inappropriate marketing on our parts? I see Tom shaking his head yes. Anybody else? Dan's shaking his head. Mike?

Dr Berend: I think the definition of MIS is: there's nothing minimally invasive about a knee replacement. I think that should be the take home message.

Dr Della Valle: And I think you can talk to them and explain to them the most important parts of the operation. I think most reasonable patients accept that and

understand that the incision needs to be made as big as it does to do the operation safely. And if they don't, maybe they don't have realistic expectations.

Paper 8: Pain and dissatisfaction following TKA performed for early stage osteoarthritis – Barrack RL, Polkowski GG, Nunley RM⁸

Dr Rosenberg: This is one of the best studies that I've seen in the past few years, it was presented at the AAHKS meeting in 2011. Bob Barrack put together a group of total knee patients that presented to the group at Washington University with greater than moderate pain and where there was no obvious source of what was wrong. These knees were clinically and radiographically normal. They weren't loose. They weren't unstable. They weren't malaligned. They weren't infected. They did not appear to have extensor dysfunction. They obtained the pre-operative X-rays in 41 of the 52, and they graded them for the degree of osteoarthritis (OA). They then compared them to three matched cohorts of total knees that had radiographically normal total knees that had pre-op X-ray grading as well.

In Group One there's a consecutive series of primaries done for OA, (108 knees). Group Two was a group of asymptomatic total knees at one to four years. Group Three were patients who had some degree of pain at one to four years. They compared these three groups. The study group, the patients who had come in during that year and had pain of unknown origin, had a higher incidence of early grade OA as opposed to late grade OA compared to any of the control groups at 49% versus 5.5, 6.25 and 10% in those other three groups, respectively.

Among the three control groups, patients asymptomatic at follow up were more likely at follow up to have had grade four changes in those with pain, 69% versus 53%. And patients undergoing TKA for less than grade four, it was their conclusion, should be informed that they are at higher risk for persistent pain and dissatisfaction. I think this is a truism that has now been sort of confirmed by a very nicely done study.

Dr MacDonald: It's a great paper, and all of us sitting up at the podium have seen this. Some knee comes in as a second opinion for a painful total knee, you know, I tell my resident or fellow find and look at their pre-op film. Because so often when you look at that, and that patient has had a replacement for an arthroscopic or an MRI diagnosis of OA, and you can't see much arthritis on the films, that's a bad deal. That patient is unlikely to do as well.

Dr Rosenberg: I like this paper because I think this is something that we all sort of agree on and have learned and are now sort of intuitive about, but it has also been shocking to me in many cases where I'm in the operating room, I'm looking at the X-ray and saying why am I operating on this patient because it is an early grade of OA. And I get in, the menisci are normal, but the cartilage surfaces are torn up. There's plenty of arthritis in that knee. The cartilage surfaces are ugly, and some of those patients do just fine.

So my sort of worry is that how do I determine the ones that are just hypersensitive *versus* the ones that have a real persistent pain but don't have severe joint space changes? And Tom, because you're a cartilage expert, do you have any advice to us on when those patients who don't have dramatic x-ray changes are deserving of a TKA?

Dr Minas: Well, a couple things I always check are a high resolution cartilage MRI scan and sometimes you'll just see what looks to be a normal X-ray but the MRI looks just awful. Exactly what you described. You know, the menisci are normal, but all the cartilage is delaminating, there are potholes all over.

Dr Rosenberg: Is that the best test to get you think?

Dr Minas: I think so and then the other thing I'll do if I have any question is fill the knee up with some local anesthetic and see if all their pain goes away. If I see that on MRI as well just to confirm that the pain is all originating from their knee.

Dr Rosenberg: I frequently do the same.

Dr Berend: The only thing I'd say is you've got to remember these patients that are dissatisfied have survivorship which is a hundred percent. So as we've just bashed uni's, which I think is inappropriate of course, these patients are considered a success, and they're not a success because they didn't have a revision, be it the registry data or any other survivorship study.

Dr Rosenberg: Yeah, I'm going to take the moderator's prerogative to say that's a stretch. That's a reach back to that uni thing.

Dr Berend: It's a good reach.

Dr Rosenberg: I think from the rest of the panel it's fair game to dump on Mike for anything he says about uni's.

Dr MacDonald: Aaron, I've got to say one thing because you asked, and I think the one thing we shouldn't draw the conclusion from is that there's no indication at all to operate on somebody unless they have, like, horrendously bad arthritis because, as you said, sometimes those patients do well. This is a cohort that hasn't done well. So it means when you're discussing it with the patient, you need to lay it out and tell them this is where your expectation is. Dan's point, pre-op education is very critical.

Dr Rosenberg: Yeah and it's important to recognise yourself, that this patient may be at the point where they need a total knee, and they will improve but still are not going to be thrilled with their total knee.

Dr Berry: Go slow with those people because if you do very many of those, it's a recipe to have an office full of people that aren't very happy. I mean, if the surface of the knee's not badly damaged, putting a new metal surface on it is not likely to make the patient happy.

Paper 9: For which indications are modular tibial exchange successful? – Lachiewicz PF, Soileau ES⁹

Dr Rosenberg: This is a nice study by Paul Lachiewicz presented at the Knee Society in 2011 asking the question, when does modular tibial exchange succeed? He looked at

39 liner exchanges that were performed when the patient met six criteria: the components had to be well fixed, well aligned, and have no significant osteolysis, while the implant itself had to have a good ten year track record in the literature, the locking mechanism had to be working, and an appropriate liner available. And there were four possible indications for liner exchange: wear, acute infection, debridement, instability, or other, including hemarthrosis, loose femur, etc. No liner exchange was performed for stiff or painful total knees.

He did 12 liner exchanges for wear, 11 for acute sepsis, four for instability, and 12 under one of these categories of other, and followed them from two to ten years with a mean of four. So for the patients who had wear, all the cases were successful at 4.3 years follow up which I think is fairly impressive. In acute infection, this was successful in nine out of eleven, and while I think it's going to be tough for us to talk about infection indications and results with this data, the operations turned out well. For instability, three out of four were successful, and in other, which included multiple other causes, 10 out of 12 were successful.

The conclusion was that significant improvements in pain scores were noted in all four groups, and significant improvements in function were noted in the infection group. Is it reasonable? Because I know for many years we have all been promoting don't do liner exchanges. You've got to revise the whole thing. I think more and more there are indications for primary liner exchanges and as outlined by Dr Lachiewicz this seems to have worked well. Your thoughts, Dr Della Valle?

Dr Della Valle: You know, I always have that stuff available, but I always tell the patient that I have a low threshold to convert to a full revision because I often find that there are subtle things that you don't necessarily recognise radiographically, so I think you need to have both available. If the liner exchange works, great, but I think there's a low threshold to do a full revision because I think at least for me, usually I'm going to do a better job.

Dr Rosenberg: Anybody have a different response? Steve?

Dr MacDonald: I agree with it, but I think we should be expecting as we go into the future that we should be doing more liner exchanges simply because hopefully our base design is better, the locking mechanism is more robust, and we should have that opportunity. But it really depends on what is driving the indication for revision. I mean, I think instability is a pretty tough one to solve this with a liner exchange unless it's just unstable because you've got poly wear. It's usually multi-factorial and, you can't upsize the constraint very much, so it depends on the indication.

But I think there is a role for this operation, but they would be single digits at our place for revisions that are simple liner exchanges in total knees.

Dr Minas: Yeah. I agree with Steve about the instability, that's the one category that surprises me here. And I don't

know how they differentiate between instability from poly wear and just a collateral ligament laxity *versus* true instability, which is often rotational and that's why it's painful, so the instability surprises me.

Dr Rosenberg: Yeah, it's a small number. Only four cases, but successful in three of four.

Paper 10: Residual varus alignment does not compromise results of TKAs in patients with preoperative varus – Magnussen RA, Weppe F, Demey G, Servien E, Lustig S¹⁰

Dr Rosenberg: This is another interesting by Phillip Niret of France presented at the Knee in 2011. And this supports some of the recent work coming from the Mayo Clinic and seems to be gathering adherents even though it seems to violate what used to be the dogma. He reviewed 535 total knees done for patients who had varus gonarthrosis, and divided them into two groups, those who had residual post-operative varus and those that had neutral alignment after surgery. He followed these patients for a mean of 5.7 years, ranging from two to 20. He compared revision rates and clinical outcome scores. He compared component alignment, limb alignment, and he separately analysed patients who had at least 10° or more of pre-operative varus. So this was a group with larger varus angulation.

He reported similar revision rates and knee scores in all groups, that residual varus of greater than 10° pre- or post-op or less than 10° did not seem to make any difference. He did find that if the tibia was put in varus with the femur in valgus, that patients tended to have poorer outcomes, indicating that the joint line was placed obliquely in reference to the mechanical axis during the procedure.

But here's a large cohort of patients where there was no difference in those that were left in varus and those that were neutrally aligned. And this seems to square up with the Mayo data that showed that this neutral alignment zone is not as important as we had previously thought. *Dr Della Valle:*

Dr Della Valle: Mike Berend, they have a series of 5, 6 or 7000 knees, so I'd defer to Mike because they showed some very clear parameters with the bad tibial varus and femoral valgus.

Dr Berend: Yeah, it's really interesting. So we showed the exact same thing. Residual tibial varus and high femoral valgus had a poor outcome. Unfortunately, it took us 6 070 knees to figure this out, and the alignment based failure rate was 0.5%. What we found is the range or the target now is much higher than we thought. At 2.5° to 7.2° of residual varus, the failure rate was identical in that rather large central range. If you tipped off into tibia varus, the rate went up to 1.5%. If you tipped off into femoral valgus, the rate also went up to 1.5%. So I think it's a little bit underpowered. And even though the title says it doesn't negatively influence it, the bottom line says it has a huge effect.

So I think the reason the knee failed, whether it's loosening of the implants, poly wear, extensor mechanism, instability etc., needs to be carefully teased out rather than just conclude that you can continue to put things into poor alignment and have expected outcomes which are good.

Dr Rosenberg: I think we've got to get away from describing something as poor alignment when we don't have the data to suggest that it really is.

Dr MacDonald: But we don't have the data to suggest doing it outside of those parameters will have anywhere near the track record long term that we've got currently. So I think it's very dangerous to start saying we can broaden up our goal when we've got a track record of a procedure at least for longevity.

Dr Rosenberg: Let me ask a question. So in the early teachings of John Insall specifically, leaving a varus knee in varus was a bad thing. You had to get out to neutral. I leave varus knees in some degree of varus. I rarely correct them out to neutral mechanical axis, with the philosophy being they've been in varus their whole life. How many people follow that sort of pattern and still will allow for some varus in their varus knees?

Dr Della Valle: I think particularly if they've got a big leg and they're female, and you put them in a lot of valgus, that's an unhappy patient.

Dr Rosenberg: Yeah, I agree with that. Tom?

Dr Minas: I tend to do that with uni's, but not so much with totals.

Dr Berend: I thought we were not allowed to talk about UKA anymore!

Dr MacDonald: It doesn't really matter for UKA because you're going back shortly to do a total knee. But I do not do what you do. I cut every tibia at 90°.

Paper 11: Conversion arthroplasty of the intertrochanteric fracture – Della Valle CJ, Mont MA, Wetter N, Johnson A, Naziri Q, Padgett DE¹¹

Dr Rosenberg: This is a multi-centered paper that Craig Della Valle is familiar with it, being lead author. Patients collected from this series represent sixty-nine total hips followed for a minimum of two years done for patients who had intertrochanteric fracture fixation that had failed. Forty-six had sliding hip screws and 23 had IM nails. Mean age of conversion was similar. They all had extensively coated femoral components at the time of THA.

At follow up the Harris hip scores were similar, but the complication rates were dramatically different. The sliding hip screw complication rate was only 4% *versus* 40%, 10 times as high, in the IM nail group. Any thoughts, gentlemen, about the use of IM nails versus sliding hip screws in intertrochanteric fractures? Dan, you've frequently lectured on techniques for trochanteric fracture conversion to THA.

Dr Berry: So I won't say that you should use this paper to decide what type of fixation to do for the inter-troch

fracture, but I think the key point is if you're doing a conversion, these data are valuable. It points out that getting an IM nail out is probably a bigger deal than removing a sliding hip screw and side plate, and you have to pay attention to that. And technically speaking, there's probably a little bit of a learning curve for all of us to go through about how to get an IM nail out and do a total hip, but the facts of the matter are it's a little bit more complex.

Dr MacDonald: What do you do for fixation? I mean the last couple I've done, you know, you've got an older patient with a DHS, that's pretty straightforward. I mean, you may have GT, you know, some trochanteric issues, but you can put a cemented stem in there. Here, you're taking these out, the canal's now polished. You know, you've got this neocortex sometimes. It's not an easy bail-out.

Dr Berry: I agree. And I think in this case you're a little more likely to go uncemented. The last one I did recently, I went uncemented even though it was an old patient because of the fact that all the things you just said.

Dr MacDonald: That's exactly why I ended up using a wide-body femoral stem because, quite frankly, the proximal metaphyseal bone with the windshield wiper was bad, so it is harder.

Dr Rosenberg: And these results were repeated by the Rothman group in another paper this year as well.

Paper 12: Metal ion levels can be measured at a community laboratory – Engh CA Jr, Ho H¹²

Dr Rosenberg: Here are two quick papers on metal ion levels. So this one from the Anderson Clinic reported by Andy Engh and presented at the closed meeting of the Hip Society in 2011, found that measuring metal ion levels in a specific metal ion lab and in a community laboratory essentially showed similar results, that the variability was high enough between the two labs that it didn't matter where you sent them.

So is this a reasonable call, as Josh Jacobs has talked about metal ions, for us to be comfortable in sending them to a routine laboratory, or do we need to identify the best lab in our local area? Dan?

Dr Berry: I'll just make a comment on it. The point I think here is that, yes, if you have a lab that can do it, they can do a good job, but you can't take for granted that any lab can do a good job. This lab did a good job. That's all.

Dr Rosenberg: Well, in this series they were actually sending samples out to multiple community labs.

Dr Berry: Yeah, I understand, but the point is that ...

Dr Rosenberg: You've got to make sure that that lab has got the equipment.

Dr MacDonald: I don't know if they mentioned the collection technique because, quite frankly, the collection technique can significantly influence and bias the ultimate ion level. So the collection technique has to be standardised. You have to know what you're doing to collect it.

Paper 13: Are metal ion levels a useful trigger for surgical intervention – Griffin WL, Fehring TK, Kudrna JC, et al¹³

Dr Rosenberg: Here is another study presented at the same Hip society meeting, this by the group from OrthoCarolina that showed no relationship between the metal ion levels obtained pre-operatively and soft-tissue damage in patients with metal on metal THA. They evaluated serum cobalt and chromium ion levels in 84 patients who were undergoing revision of symptomatic metal on metal total hips - at symptomatic MOM revision. Cobalt levels ranged from 0.8 to 236 parts per billion (ppb) and chromium levels from 0 to 112 ppb. While there was a trend toward higher metal ion levels in patients with more tissue damage, there was relatively poor sensitivity and specificity as predictors of soft tissue damage (Co: 60%, 62%; Cr: 36%, 80%).

The positive predictive value for cobalt was 46% and for chromium was 26%. However the time to revision correlated significantly with the amount of soft-tissue damage ($p = 0.5$).

Does that make sense, that you can't rely on the metal ion levels to tell you how much soft-tissue damage is going to be present but there is a correlation with damage and the time to revision?

Dr MacDonald: There's probably some inter-individual response to the metal ion debate where you give one patient the same load as another patient, they're probably going to have a different reaction.

Dr Rosenberg: And you can't predict that from the individual patient.

Dr MacDonald: The ion levels are a marker, but there's no question the higher the ion levels, the higher probability is you have soft tissue damage. Multiple authors have shown that in the resurfacing model.

Dr Rosenberg: Very good. Well, I want to thank you for your participation, gentlemen.

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References

1. Bozic KJ, Kaufman D, Chiu V, Caminiti S, Lewis C. Factors that influence patient selection of an orthopaedic surgeon and hospital for TJA. *21st Annual Meeting of the American Association of Hip and Knee Surgeons*. Dallas, Texas, November 5, 2011.
2. Ghomrawi HM, Mancuso CA, Westrich GH, et al. Discordance in TKA expectations between patients and surgeons. *Clin Orthop Relat Res* 2012;(Epub ahead of print).
3. Sharkey PF, Lamplé A, Huang R, Parvizi J, Arnold WV. Total joint arthroplasty: should patients have preoperative dental clearance? *Summer Meeting of The Hip Society*. New Albany, OH, September 23, 2011.
4. Berend KR, Lombardi AV Jr, Morris MJ, Hurst JM, Kavolus JJ. Does preoperative patellofemoral joint state affect medial unicompartmental arthroplasty survival? *Orthopedics* 2011;34:494–496.
5. Rancourt MF, Kemp KA, Plamondon SM, Kim PR, Dervin GF. Unicompartmental knee arthroplasties revised to total knee arthroplasties compared with primary total knee arthroplasties. *J Arthroplasty* 2012;(Epub ahead of print).
6. Peters CL, Stronach BM, Pelt CE, Erickson JA. Open surgical dislocation for the treatment of femoroacetabular impingement: past, present, and future. *Instr Course Lect* 2012;61:273–286.

7. **Wegrzyn J, Parratte S, Coleman-Wood K, Kaufman KR, Pagnano MW.** The John Insall Award: No benefit of minimally invasive TKA on gait and strength outcomes: a randomized controlled trial. *Clin Orthop Relat Res* 2012;(Epub ahead of print).
8. **Barrack RL, Polkowski GG, Nunley RM.** Pain and dissatisfaction following TKA performed for early stage osteoarthritis. *21st Annual Meeting of the American Association of Hip and Knee Surgeons*. Dallas, Texas, November 5, 2011.
9. **Lachiewicz PF, Soileau ES.** For which indications are modular tibial exchange successful? *Members Meeting of The Knee Society*. London, Ontario, Canada, September 16, 2011.
10. **Magnussen RA, Weppe F, Demey G, Servien E, Lustig S.** Residual varus alignment does not compromise results of TKAs in patients with preoperative varus. *Clin Orthop Relat Res* 2011;469:3443–3450.
11. **Della Valle CJ, Mont MA, Wetter N, Johnson A, Naziri Q, Padgett DE.** Conversion arthroplasty of the intertrochanteric fracture. *Summer Meeting of The Hip Society*. New Albany, Ohio, September 24, 2011.
12. **Engh CA Jr, Ho H.** Metal ion levels can be measured at a community laboratory. *Summer Meeting of The Hip Society*. New Albany, Ohio, September 23, 2011.
13. **Griffin WL, Fehring TK, Kudrna JC, et al.** Are metal ion levels a useful trigger for surgical intervention? *J Arthroplasty* 2012;(Epub ahead of print).