Piedmont Orthopedic Society

ABSTRACTS 1999

1999 The Management of Equinus Deformity in Cerebral Palsy

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The patients were diagnosed and followed at Duke clinics, inpatient and outpatient units sponsored by the North Carolina Health Department and North Carolina Cerebral Palsy Hospital. Surgical treatment was done at Duke by several different surgeons, but each patient included in the study was seen in follow up by the principle investigator. The outcomes of the different cohorts of foot deformities were prepared by comparing the described preoperative condition of the foot to the postoperative condition; and, by comparing feet in similar categories treated by one method to similar feet treated by other methods. For example, comparisons were made between patients who had equinus treated by rerouting of the posterior tibial and the peroneal muscle units anteriorly to those treated by lengthening of the triceps surae, or the peroneal muscles, or the posterior tibial tendons. Also, comparison was made between patients who had the entire anterior tibial tendon transferred laterally compared with those that had a split anterior tibial tendon transfer; or, comparison between patients who had heelcord and posterior tibial lengthening compared to those who had a split posterior tibial tendon transfer to the peroneal tendon and a heelcord lengthening.

The critical procedure for all equinus deformities was lengthening of the triceps surae. There was no objective advantage in lengthening the gastrocnemius muscle in the middle third as compared with the triple cut heelcord lengthening, or a z-lengthening. Also, there was no advantage in doing a split posterior tibial tendon transfer and heelcord lengthening as compared with lengthening of the posterior tibial tendon provided that the peroneal muscles were at least 4/5 strength. Furthermore, equinovarus feet with weak peroneals were improved by posterior transfer of the flexor hallucis longus to the peroneus brevis and a heelcord lengthening and limited lengthening of the posterior tibial tendon. Pre-surgical assessment required manual muscle testing, Xylocaine injection of an overactive muscle, and the spontaneous recovery of apparently weak muscles that were allowed to function through a full range once the pathologic muscle was lengthened. The equinovalgus was due to contracture of the triceps surae and of the peroneal muscles. The peroneal tendons were lengthened sequentially with Achilles lengthening. The peroneus longus was frequently transferred to the triceps surae contemporaneously with lengthening of the calf muscle to maintain strength. This was done if the anterior tibial muscle strength was at least 4/5.

The tension of a transferred tendon was determined by clinical observation in over 400 patients on whom tendon transfers had been done for foot deformities in cerebral palsy. If the transfer is inserted too loose, the sarcomeres do not decrease in number and the transfer becomes adherent to surrounding tissue and function is minimal. If the transfer is inserted excessively tight, the sarcomeres may multiple, but not always enough to establish a balanced motion. A dependable tension on the muscle belly at the time of tendon transfer is one that is 60% of the measured excursion of the active muscle being transferred in the anesthetized extremity. For example, if the measured excursion is 3 cm., and the foot is held at right angles to the tibia, a muscle belly tension of the transferred tendon of 1.8 cm. is marked after measurement of excursion and the final fixation is done with the muscle-tendon unit at that tension.

Spastic equinovalgus is managed either by soft tissue surgery alone or by both soft tissue and bone surgery. Examples of treatment are: (1) an equinovalgus foot is managed by a triple cut heelcord lengthening, lengthening of the peroneal tendons, and a subtalar arthrodesis with an allograft. (2) In another situation with less deformity, the peroneus longus may be transferred to the dorsum of the foot and the medial plantar calcaneonavicular ligament and the posterior tibial tendon are shortened. A medial translation calcaneal osteotomy may be used rather than subtalar fusion; or, a subchondral osteotomy of the talus may complement the soft tissue realignment.

Equinovarus feet were managed by triple cut lengthening of the posterior tibial tendon, lengthening of the toe flexors, and transfer of the anterior tibial to the dorsum of the second cuneiform simultaneously with a

closed wedge lateral osteotomy of the cuboid or the calcaneus. An open cuneiform osteotomy was done to correct forefoot adduction and supination. Cavus was managed by plantar fasciectomy and a dorsal closed wedge osteotomy of the first metatarsal.

Aphorisms were developed as the records were reviewed.

1. A subtalar arthrodesis lessened the need for repeat heelcord lengthening with growth.
2. A persistent 15° equinus at the tibiotalar joint diminished recurrent equinovarus if the subtalar joint was intact.
3. From age 3 to 8 years, ankle-foot orthoses (AFO) was used part time during the day and full time as a night splint.
4. Patients 8-14 years frequently required relengthening of the triceps surae and/or the peroneals because of growth and recurrent contracture.
5. Relengthening of the Achilles tendon was done by coronal or "z" technique and not by triple cut.
6. If weak dorsiflexor muscles were reinforced with tendon transfer, recurrent heelcord contracture was infrequent.
7. Equinus in a pre-adolescent patient seldom required posterior tibiotalar capsulotomy at the time the heelcord was lengthened.
8. Recurrent equinus resulted from weak dorsiflexor muscle strength and rapid growth.
9. Over-lengthening of the triceps surae was avoided by using a triple cut lengthening technique and placing the foot in 5°-10° equinus rather than calcaneus.
10. Tendon lengthening, per se, is more accurate and controlled better than intramuscular tendon lengthening.

In this entire group of patients, a satisfactory result or outcome was present in at least 90% of the patients based on: (a) Elimination of the AFO. (b) Conventional shoes. (c) Eventual elimination of night splints. (d) Minimal pain or discomfort.

1999 Physical Impairment and Functional Outcomes in Patients Over 65 after Lower Extremity Fractures

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PURPOSE: The purpose of this study was to evaluate physical impairment and functional outcomes in a group of patients over 65 who had sustained lower extremity fractures.

MATERIALS AND METHODS: Thirty patients over 65 who sustained unilateral lower extremity fractures from January 1992 to February 1998 involving one or more of the following bones: (1) acetabulum, (2) femur, (3) tibia, (4) fibula, (5) calcaneus, and (6) talus, participated in the study. The average age was 74. Most of the injuries were closed (41) with one type 1 open and six type 3 open fractures. The average Injury Severity Score was 12. At the follow up visit (mean 34 months), the patients were evaluated for range of motion, lower extremity strength with a Primus Machine, and pain using a visual analog scale (VAS). The participants also completed a SF-36 questionnaire. Rank coefficients were used to assess the strength of the relationship between the SF-36 disability score and physical impairment. SF-36 scores from the study group were also compared to age-matched controls to determine relative disability. Mean ROM and muscle strength for injured and non-injured extremity were compared.

RESULTS: There was no statistically significant difference in ROM or muscle strength of injured and non-injured extremity, except knee flexion. VAS rating were low with an average of 3.4. The Mental Component Score (MCS) of SF-36 in our study population was statistically different from controls with no statistical difference in the Physical Component Score (PCS). A moderate correlation was found between

the PCS and physical impairment.

DISCUSSION AND CONCLUSIONS: The moderate correlation between physical impairment and the PCS of the SF-36 helps validate this questionnaire as a simple yet effective tool The data presented show that elderly patients after lower extremity fractures have a good prognosis. The only significant disability was in the MCS of the SF-36. No significant impairment was found except during knee flexion. Patients over 65 who have suffered a lower extremity fracture have a moderate functional disability based on their MCS with no difference in their PCS or physical impairment between their injured and non-injured extremity except for knee ROM.

1999 Outcome Assessment of Lumbar Fusion

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Our study aimed to evaluate the outcome of lumbar fusion and explore the possible roles of age, sex and spinal disorder on a patient's outcome. We conducted a retrospective review of 90 patients who underwent lumbar fusion between 1995 and 1998. Comparison of patient's back pain, leg pain and buttock pain before and after lumbar fusion showed that pain in these was significantly reduced by lumbar fusion. Analysis of the outcome in patients of different ages indicated that lumbar fusion significantly reduced the back pain, leg pain and buttock pain in patients 40-50 years old and patients 60-80 years. For patients 20-30 years old, their back pain and buttock pain were also significantly reduced by lumbar fusion, but no significant decrease of leg pain was observed. The decrease of the back pain and buttock pain by lumbar fusion was not significantly different among different ages, but the decrease of the leg pain in patients 20-30 years old was significantly lower than that in patients 60-80 years old. Investigation of the outcome in patients having different gender demonstrated that lumbar fusion significantly reduced the back pain, leg pain and buttock pain in both female and male patients. There was no significant difference in the diminution of bodily pain in these areas between female and male patients. Assessment of the outcome of lumbar fusion in patients having a specific disorder showed that the surgery significantly decreased the back pain, leg pain and buttock pain in patients having degenerative disc disease or spinal stenosis. In patients with spondylolisthesis, lumbar fusion significantly reduced back pain and leg pain while the decrease of buttock pain in these patients was not statistically significant. Comparison of patients' PCS12 (Physical component score for SF12) and MCS12 (Mental component score for SF12) score before and after lumbar fusion showed that the surgery also significantly improved the patient's physical status, with no significant improvement of mental status. This study demonstrated that lumbar fusion can significantly decrease patient's back pain, buttock pain and leg pain, while significantly improving the patient's physical status. The effect of sex and spinal disorders on the outcome of lumbar fusion was not significant; neither was age a significant factor in the reduction of back pain or buttock pain. The possible role of age on the reduction of leg pain was demonstrated but needs further investigation.

1999 Supracondylar Varus Malunion May Cause Late Posterolateral Rotatory Instability of the Elbow

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Although cubitus varus malunion has traditionally been thought to represent only a cosmetic deformity, this is not so. The purpose of this multi-center, multi-national study was to document a series of 21 cases of delayed onset recurrent posterolateral rotatory instability of the elbow secondary to varus malunion of the distal humerus.

After recognizing this condition, the senior author identified ten other upper extremity surgeons who had seen and treated patients for delayed onset recurrent posterolateral rotatory instability of the elbow decades following a supracondylar distal humeral fracture that resulted in varus/internal rotation malunion. The average age at the time of presentation was 33 years. All of the patients had pain and physical findings

included cubitus varus, tenderness over the LCL common extensor tendon, a prominent tendon of the medial triceps, and a positive posterolateral rotatory apprehension test. Cubitus varus malalignment averaged 15 degrees. Treatment consisted of supracondylar osteotomy alone in three cases, lateral collateral ligament reconstruction alone in eleven, and both procedures in eight. At a minimum one-year follow up, only two patients had recurrence of their symptoms of instability, while the others had improvement in their pain.

This paper is meant more to be a description of the condition than an evaluation of its treatment. Varus distal humeral malunion following a pediatric supracondylar fracture displaces the mechanical axis of the triceps medially generating an external moment (torque) around the long axis of the ulna such that the ulna "supinates" away from the humerus. Chronic overpull on the medial side of the olecranon causes stretching of the lateral collateral ligament complex due to the repetitive rotational displacement of ulna away from the humerus. We suspect that this condition is (1) previously unrecognized, (2) not rare in adults with cubitus varus from pediatric supracondylar fractures, (3) a cause for chronic elbow pain in these patients, and (4) a preventable complication (i.e. by early corrective osteotomy).

"Stabilization of the Lumbosacral Spine – Indications, Implants and Caveats. Richard J. Nasca, M.D., Greenbelt, Maryland.

The purpose of the study was to evaluate the indications for lumbosacral arthrodesis and the complications of instrumentation. The study was a retrospective chart and radiologic review with office follow-ups. MATERIALS: 93 consecutive patients treated during 1996, 1997 and 1998 were reviewed. Age rage was 17 to 89. Indications for surgery were spinal stenosis with listhesis in 27, failed laminectomies in 14, disc resorption and instability in 13, isthmic spondylolisthesis in 12. Nonunion of a previous fusion in 9, spinal deformity in 8, spinal stenosis above a previous fusion in 8, and fracture dislocations in 4 patients. Surgical approaches were posterior in 74, anterior in 16, and anterolateral in 7. One patient had anterior and posterior approaches. Pedicle screws and rods were used in 68 patients, BAK and RAY cages in 15, anterior vertebral screws and rods in 6, HARMS cages in 5, and Z-plates in 3. RESULTS: Pedicle screw complications included one screw breakage and rod breakage in 1 patient. Three patients had radiculopathy due to the proximity of screws to nerve roots. Pedicle fixation was removed electively in 3 patients and in 1 patient for infection. A total of 396 screws were used. Six patients had cages placed by a posterior approach. One patient had L5 neuropraxia which recovered. Another had cage retropulsion which required emergent revision. No permanent neurological deficit resulted. Fourteen cages were placed by an anterior approach usually retroperitoneal. A tear in the left common iliac vein occurred in two patients. A single RAY cage placed at L4-L5 required early revision for loosening. CONCLUSIONS: The author concludes that titanium pedicle screws and rods are safe, effective, and durable. C-arm and pedicle screw stimulation was helpful in avoiding malposition. Cages placed from a posterior approach may result in neuropraxia due to retraction of the neural elements. Excessive facet and pedicle removal may also be required. Posteriorly placed cages do not provide adequate fixation for patients with instabilities. Revision is difficult. Anteriorly placed cages are ideal in females for L5-S1 discopathology. Retrograde ejaculation may occur in males but this was not noted in our series. Tears of the common iliac vein and vena cava can occur in patients who have had previous L4-L5 diskectomies. Laterally placed cages in the lumbar spine except at L5-S1 appear promising although experience is limited. Z-plates with HARMS cages resulted in stable fixation after vertebrectomy. Excessive retraction of the iliopsoas in the anterolateral approach should be avoided to prevent lumbosacral plexus neuropathy.

1999 Vascularized Bone Allotransplantation – Is It Time?

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Two recent hand allotransplants have generated considerable interest into their efficacy and anticipated long term problems of healing, function, chronic immunosuppression, and rejection. This experimental canine study has been done to investigate long term high dose cyclosporine prevention of vascularized fibula allograft transplant rejection

Purpose of Study: to learn the efficacy of long term cyclosporine A therapy on the healing, remodeling, and mechanical performance of vascularized fibula transplants.

Methods Used: Fifteen beagle dogs were assayed for DLA Class II reactivity using mixed leukocyte cultures. The mismatched pairs were used and vascularized fibular allografts were then done with fibulae switched in each pair. The proximal 8 centimeters of fibula were harvested based on the popliteal vessels and their two major branches – the cranial tibial and caudal tibial vessels. These vessels along with a large one centimeter circumferential muscle envelope was the transplant composite. Two surgery teams did the procedures simultaneously. Total time for surgical completion of both dogs was always less than five hours. Transplant warm ischemia time was always kept under two hours. The contralateral extremity had either a vascularized autograft harvest without detaching the pedicle or a sham procedure. Cyclosporine A was given subcutaneously 25 mg/kg from seven days preoperative to 14 days postoperative, then 20 mg/kg from 15 days postoperative to 45 days postoperative, and then 15 mg/kg from 46 days postoperative onwards. Blood cyclosporine levels were assayed biweekly and the dosage adjusted to maintain high therapeutic levels (>750 ug/liter but <1100). Fluorochromes were given at intervals postoperative. We killed eight dogs three months postoperatively and seven dogs were killed six months postoperatively. The central segment was tested post mortem in torsion to failure, and applied torque v. Angle of twist recorded. Serial 100 micron cross-sections were prepared in the central 1 centimeter section and 5-6 micron sagittal sections were prepared for light and epifluorescent microscopy. Data were analyzed by ANOVA and by paired and unpaired t tests.

Summary of Results: We maintained cyclosporine blood levels above the therapeutic level. The vascular pedicle was patent in 14 of 15 allografts at kill. The soft tissue envelope was vascular and mildly fibrotic resembling that of vascularized fibula autografts. The vascularized allografts were as strong and stiff as the controls. Fluorochrome uptake was also similar to controls with osteon forming throughout the study period. The sagittal sections of the fibula heads showed active remodeling of the cancellous bone. Morbidity associated with chronic high dose Cyclosporine included chronic gum lesions (hyperplasia), skin lesions (weeping sores and dermatitis), interdigital web abscess formation, and increased susceptibility to upper respiratory infections.

Major Conclusions: The vascularized allografts in these dogs that received high dose, continuous cyclosporine A therapy were indistinguishable from the vascularized autograft controls. These results are in contrast to our previous results where short term, high dose cyclosporine or continuous, low dose cyclosporine resulted in transplant rejection. Continuous high dose Cyclosporin A treatment completely suppressed the antibody response, maintained pedicle patency, and cortical remodeling. It enhanced the cancellous bone remodeling and incorporation. There was increased morbidity associated with the chronic high dose Cyclosporine due to greater susceptibility to infections.

1999 Free Vascularized Fibular Bone Grafting for the Treatment of Femoral Neck Nonunion in Young Patients

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The purpose of this study is to examine the results of free vascularized fibular grafting as a treatment for nonunion of the femoral neck in patients under fifty years of age. Twenty-two consecutive patients underwent vascularized bone grafting between 1984 and 1998 for nonunion of the femoral neck after failed internal fixation. Mean age of the patients was 28.7 years. There were thirteen males and nine females. Mean intervals between internal fixation and free vascularized fibular grafting was 18.3 months. The average follow-up to date is 62.5 months. All nonunions healed. Two patients required an additional procedure to facilitate union; one patient had iliac crest bone grafting at four months postoperatively; and another underwent muscle-pedicle grafting at six months postoperatively. The average time to union was 9.9 months. Progression of osteonecrosis of the femoral head occurred in thirteen patients. Two patients progressed from stage I, on to stage IV and the other to stage V. Six patients progressed from stage II to stage IV. Four patients progressed from stage II to stage V. One patient went from stage III to stage V.

Successful long-term salvage of the femoral head was achieved in twenty of twenty-two patients. Two patients required conversion to total hip arthroplasty secondary to disabling pain and progression of osteonecrosis. Four patients required hardware removal or exchange for intraarticular migration of supplemental hardware fixation. These were without clinical sequelae. One patient underwent painful hardware removal. Based on these results, compared with previously reported treatments for the difficult problem of femoral neck nonunion, free vascularized fibular grafting compared favorably with a high union rate (100%) and successful long term salvage of the femoral head in 91% with a mean follow-up of greater than five years.

1999 Anatomy and Biomechanics of the Hip Capsule

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The hip joint capsule functions to constrain translation between the femur and the acetabulum while allowing rotational and planar movements. The hip capsule is susceptible to traumatic injury and iatrogenic damage from surgical incision. Despite the crucial role the hip capsule plays in the pathogenesis of hip instability, little is known about the biomechanics of the hip capsule. This study reviews our analysis of the mechanical properties of the iliofemoral, ischiofemoral and femoral arcuate ligaments of the hip capsule. Ten cadaveric specimens of each ligament were tested to failure in tension. Force at failure, stress at failure, material and structural strain at failure, energy absorbed, and stiffness were measured for each ligament. The three ligaments differed significantly in these properties ($p<0.00005$). The iliofemoral ligament exhibited greater force at failure ($p<0.05$) and was stiffer than the ischiofemoral and femoral arcuate ligaments ($p<0.01$). Material and structural strain for the femoral arcuate was higher than for the other ligaments ($p<0.05$). The femoral arcuate withstood the highest stress. In summary, the anterior ligaments were stronger than the posterior ligaments, explaining the higher incidence of posterior hip dislocation observed clinically. The strength and the mechanical properties of the hip capsule ligaments reflect the upright posture of human gait. Understanding the strength and the mechanical properties of the ilioischial ligament in particular has allowed us to change our capsular incision to avoid dividing this ligament during total hip replacement. We feel that further study of hip capsule ligaments will be valuable in understanding the contribution of individual capsular components to hip joint stability.

1999 Operative Management of the Stiff Elbow: Indications and Conclusions

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Elbow stiffness can result in significant disability. Most series evaluate outcome after surgery for one surgical approach to the post-traumatic stiff elbow, usually with extrinsic pathology only. The purpose of this study is to evaluate the outcome of surgery in a large series of elbow contractures that are mixed both in terms of etiology and pathology. Fifty-seven elbow contractures that had failed an average of 6 months of nonoperative therapy were treated by a single surgeon over an 8 year period. Follow-up averaged 25 months. The average patient age was 37 years and the dominant extremity was affected in 57% of cases. Thirty-nine previous surgeries had been performed in 25 patients. Contractures were divided into 1 of 4 sub-groups based on etiology: 34 post-traumatic (*PT*), 14 degenerative (*DJD*), 6 rheumatoid (*RA*), and 3 neurologic (*NL*). The preoperative (preop) flexion arcs for these sub-groups were 62°, 92°, 98°, 7°, respectively. Only 9/57 (16%) elbows had at least 30° of extension and 130° of flexion before surgery. A total of 28 patients had significant preop pain and rated it an average of 6/10 by subjective questionnaire. The surgical procedures, in addition to capsular release, needed to restore motion and/or to relieve pain varied by etiologic sub-group. In the *PT* and *RA* sub-groups, the lateral approach was used most often. In the *DJD* and *NL* sub-groups, the posterior and medial approaches, respectively, were used most often. The postoperative (postop) flexion arc/percent improvement in motion for the *PT*, *DJD*, *RA*, and *NL* sub-groups were 111°/79%, 114°/24%, 108°/10%, and 94°/1243%, respectively. Forty out of 57 (70%) elbows had at least 30° of extension and 130° of flexion after surgery. Statistical analysis showed that worker's compensation, litigation, smoking, and degenerative changes did not adversely affect motion gain in any sub-group. Significant differences in preop motion were noted between all sub-groups, with the exception

of the *DJD* and *RA* sub-groups ($p<0.05$). However, there was no significant difference in postop motion between any of the sub-groups ($p<0.05$). The pain questionnaire was readministered after surgery and the average score improved to 1.2/10. Significant postop pain was not consistently related to intrinsic disease, but always related to worker's compensation issues. Seven complications occurred in this series, including 3 self-limited ulnar nerve parasthesias. This is the largest series of both post-traumatic and etiologically mixed elbow contractures in the literature. Similar postop arcs of motion should be expected for stiff elbow despite either underlying etiology or the presence of intrinsic disease. Secondary gain issues do not impair motion gain but were associated with postop pain.

1999 Pelvic Osteolysis Following Total Hip Replacement

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I am suspicious of any doctor who uses his own infirmity to make a point or to write a paper. While their problems are interesting, they seldom are instructive, so I obviously have some reservations about this paper.

I'd like to apologize early about this presentation, to quiet some criticism from my more academic friends. While this is a clinical study, there is only one person, there are no controls, there is no hypothesis, and no P value, and as of now there are no confirmatory studies. However, the subject happens to be me and a prediction I made several years ago seems to have come true and I wish to share that with you.

The natural history of pelvic osteolysis is gradually becoming clear. The third body particles are produced by the titanium or chrome head working against polyethylene. The third body shards are pumped into the periprosthetic area, ingested by white cells and mast cells; enzymes are produced, osteoclasts are recruited and there is eventual failure of the prosthesis. While we blame the enzymes that are produced by the white cells and the mast cells, the real culprit in this scenario is the osteoclast, which increase in great number secondary to this cascade of events. It is now understood that any hole in bone is mediated by the osteoclast.

Pelvic osteolysis does occur in one other condition and that is degenerative arthritis. Large cysts are often seen about the hip in osteoarthritis. The mechanism is the same as in total joint replacements; that is, debris is forced through the cartilage into the bone with resulting cyst formation.

Let me tell you about my particular story. In 1971, while playing racquetball I had a sudden in and out dislocation of my right hip. Following this I had increasing pain until 1982 when x-rays showed severe degenerative arthritis and early avascular necrosis. From 1982 to 1992, I gradually became worse, with loss of motion and increasing pain. After a pheasant hunt in South Dakota, the femoral head collapsed and I felt that surgery was unavoidable.

Before this occurrence, I had some very specific ideas about who would do the hip, when and where. But, I can assure you that once the pain began I would have let anyone, short of second year resident, perform the operation. As it turned out I had one of the best orthopedic surgeons,, Don McCollum, do the surgery. Don used a press fit osteonics hip, a cup with multiple screws and he used a posterior approach. None of these suited me particularly well but then again Don did not ask my opinion.

I felt so good immediately following the surgery that in three weeks I was able to return to work. By six weeks I was actually thinking I could return to playing racquetball and perhaps even start quail hunting again. Obviously, I was too young, too heavy, too active and as you might suspect, too stupid. What happened was the rapid development of osteolysis and by 1994 I had a large cyst about the screw threads and by 1995 developed a very large medial cyst of the acetabulum. By 1996 I had cephalad migration of the femoral head within the cup and certainly I must have fallen into that group that had 0.5 mm or more of wear per year.

The pain was quite severe, I was limping dramatically and I started looking for help. The question that arose was, should I wait? should I have revision? or should I find some other means to stop the pelvic osteolysis? There aren't very many options and I sought opinions from the people at Duke, The Hungerford group in Baltimore and almost anybody else who would listen.

About to have surgery, I noticed a 1994 report about Fosamax a new bisphosphonate. The report mentioned that it stopped osteoclastic activity and had been found to stop and clear the lesions of multiple myeloma. This certainly attracted my attention and I contacted Merck and learned more about the drug.

Fosamax or Alendronate is localized specifically at the site of bone resorption under the osteoclast. It selectively blocks the osteoclast from resorbing the bone and as a result the osteoblast then will eventually fill in the defect leading to healing or increased bone mass. This has been proven dramatically in females with osteoporosis.

Fosamax is taken orally but is poorly absorbed and must be taken with a full glass of water thirty minutes before any meal or other medications. The only real side effect is gastric irritation and reflux.

I took Fosamax 20 mg. a day and the pain subsided within three weeks. By six months I was almost free of pain and by one year there was radiological evidence of healing of the osteolysis. By the third year, which was 1998 there was complete resolution of the large central cyst and the cyst about the screws.

There is no report in the literature of this occurring spontaneously or with any medications. In fact, all of my colleagues felt that the only way to treat this problem was by surgery and by massive bone grafting. (I might mention parenthetically that Gary Poehling suggested an arthroscopy with injection of bone paste into the large cyst.)

A large number of questions need to be answered.

1. Am I really healed? No, it's far too early to say that but certainly the bone cysts have filled in.
2. Will the wear and tear in the third body production stop? The answer, certainly not, I still have third body sharding going on and these third bodies are still there. Even in the face of Fosamax, which stops the osteoclastic activity, I'll eventually have to have the polyethylene cup revised.
3. Is this an example of idiosyncratic reaction? I don't know. In fact, what we are seeing may just be the normal history of pelvic osteolysis, which is not well documented, but I don't think so. I feel that Fosamax has played a real part in the clearing of these lesions.

The greater question is will Fosamax delay or stop osteolysis about all total joints? Obviously, I can't say that but I will say my pain decreased and that the bone healed. I will resist the temptation to say something profound, so, I'll leave it to your better judgment whether this drug should be given to your patients who've had total replacements; I'm giving it to mine. Further studies are now ongoing at several centers and hopefully we'll have an answer to whether this drug really works in the near future.

1999 Cervical Spine Trauma-Who's Treating It and How?

David C. Urquia, M.D., Mechanicsville, VA

All the current members of the Piedmont Society were surveyed by mail, and questions submitted concerning treatment of cervical spine fractures and dislocations. A total of 88/400 surgeons responded to the survey. Of those responding, 72 surgeons no longer treat these injuries, and 16 surgeons are actively involved in the care of cervical spine trauma.

From the 16 surgeons currently treating the cervical spine, a variety of data were collected. Halos were still being used, an average of 8 halos placed per surgeon per year. 63% of respondents still use halo ring traction for acute fractures and dislocations. The respondents employ a wide variety of surgical techniques for acute trauma. Of the newer techniques, only 13% (two) use odontoid screws, and 33% (five) use either C1-C2 trans articular screws or cervical pedicle screws.

In terms of specific treatment options, cervical orthosis was the most commonly used device for unilateral subaxial facet fractures, without subluxation. Primary posterior fusion was the treatment of choice for patients with unilateral facet dislocations or fracture-dislocations, reduced in traction. Brooks fusion was the treatment of choice for acute C1-C2 subluxation. For patients with bilateral facet dislocations, with neurological injury, the initial management of choice was attempt at halo traction reduction. Preoperative cervical MRIs were preferred on any patient about to undergo open reduction of a facet dislocation, and all patients would be fused primarily for an open facet reduction procedure. Only about half the respondents would use SSEP-MEP monitoring for their trauma procedures. With an intact lamina, the preferred method for posterior fusion was interspinous wiring. Answers were split on the question of acute flexion-extension plain x-rays on a traumatized patient. The majority of respondents said they would not get acute bending x-rays on a patient with a known cervical spine fracture. There were multiple answers given for the question of how to achieve posterior stability after anterior decompression for trauma. The most common answer was to apply an anterior plate along with halo following anterior bone grafting, and not do a primary posterior fusion procedure to supplement. 44% of the respondents gave that answer. 31% of the respondents would have done a combined anterior and posterior fusion. All respondents would choose to leave a bullet fragment in place permanently within the spinal canal if the patient had immediate and complete paralysis as the result of gunshot wound. Halos are not being used by any of the respondents for a variety of less serious cervical spine fractures, (without neurologic deficit), as listed in the survey.

1999 A Comparison of Finger Joint Laxity in the Normal and Cerebral Palsy Patient: Increased Laxity in the Athetoid Form

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OBJECTIVE: To test the hypothesis that patients with different isoforms of cerebral palsy have different degrees of joint laxity as determined by simple passive extension of the index finger.

DESIGN: Observational case-control study.

METHODS: Using a photographic method the passive extension of each joint in both index fingers of each subject was measured and compared in 16 patients with athetoid hemiplegic cerebral palsy, six patients with athetoid quadriplegic cerebral palsy, 11 patients with spastic quadriplegic cerebral palsy, and 24 age, sex, and race matched subjects without cerebral palsy (normal controls).

RESULTS: **All groups** had similar index finger metacarpalphalangeal joint extension. However, the proximal and distal interphalangeal joints of the index fingers of subjects with **athetoid hemiplegia** could be extended by more than 30 degrees on the athetoid side, when compared to the unaffected side ($p<0.00001$). Similarly, the index finger interphalangeal joints of subjects with **athetoid quadriplegia** could be extended 20-30 degrees more than the proximal and distal interphalangeal joints of subjects with **spastic quadriplegia**, or the **control subjects** ($p<0.00001$).

CONCLUSION: The results of this study establish an association between perinatal brain injury resulting in decreased muscle tone in the "pure" athetoid patient and the structures that determine joint laxity.

1999 Rotator Cuff Repair in Patients Over Age 70

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SUMMARY: Historically Codman and Bosworth described the "Supraspinatus Syndrome" in 1930s and

40s respectively. McLaughlin (1945), Moseley (1951), and Neer (1972) described "Ruptures" or tears of the supraspinatus or Rotator Cuff.

Repair has been carried out in all age groups. By necessity the type of repair is determined by the size of the tear. "Standard" open repair with acromioplasty, arthroscopically assisted "mini open" repair, and now an evolving arthroscopic repair in small to moderate tears, have been described.

The challenge of repair in large or massive tears raises the question whether to even attempt repair, especially in older age groups. Rockwood et. al. have advocated actual debridement of the remaining cuff with extended deltoid rehab. Depalma reported 90% of patients "recover" without surgery.

Neer, however, described "Cuff tear Arthropathy" in 1983, which complicated the status of shoulders, when rotator cuff tears were left unrepaired. While short-term patients did reasonably well, long-term almost all patients progressed to stiff painful shoulders requiring prosthetic replacement. Prosthetic replacement in a shoulder with no rotator cuff is at best a "limited goals" type situation. There still remains controversy as to whether it is better to repair or not to repair in the advanced age group.

We evaluated the results of 28 cuff tears in 25 patients age 69-86 treated between 1994 and 1998. 26 of 28 were either large (4-6 cm.) [11] or massive (6 cm.) [15]. Postop 25 of 28 were placed in an abduction orthosis at 75-85° abduction, 30° forward flexion, 45-60° external rotation. All patients had physical therapy and passive ROM was begun on the 3rd or 4th postop day.

RESULTS: ROM: Postop 17 achieved excellent ROM (full normal ROM), 6 were good (achieved overhead motion but less than normal), 5 were fair (less that 90° forward flexion actively).

STRENGTH: 22 Good (better than preop), 6 Fair (equal to preop), 0 Poor (worse than preop).

PAIN RELIEF: 22 Good (complete pain relief), 6 Fair (incomplete pain relief), 0 Poor (no pain relief).

It is our opinion that repair of the rotator cuff in advanced age groups (over age 70) is warranted in most cases. Only mental deficiency or other disability which would prevent postop physical therapy would be considered contraindications. All our patients reported improvement and felt that they were "glad they had the surgery". Their ability to assist with activities of daily living and personal care was a major benefit pointed out by patients and their families. Early diagnosis is the key and all patients with "fair" ROM and strength had apparent injury greater than 6-8 months at the time of presentation, for surgical treatment.

1999 Problems in Donor Site after Anterior Crucial Ligament Reconstruction Using Patellar Tendon
Pantelis Nikolaou, M.D. and N. Piskopakis, M.D.

The purpose of this study is to determine the morbidity at the patellar tendon donor site in patients with ACL insufficient knees.

Clinical evaluation was performed on 1420 patients with ACL reconstruction using the mid-third of the patellar-tendon. We evaluated their functional pain on PT joint after activities, and any pain (finger point) over the donor site of the patellar tendon and patellofemoral joint.

Radiographic evaluation of the length of the patellar tendon was performed in 100 patients with 1½ year follow up. Using the Blackburne-Peel method, a measurement of the length of the patellar tendon was obtained preoperatively, just after the operation, and 6 months postoperatively. The patellar tendon gap was closed in all our cases.

Patellar tendon problems and PT femoral problems such as pain after activities, pain (finger point) over

patellar tendon was found in 113 patients (8%).

No patient demonstrated evidence of patellar tendon shortening greater than 2-3 mm which was statistically not significant.

We conclude that:

I. There is no evidence that the use of the mid-third of the patellar tendon causes measurable patellar tendon changes. This is probably due to the aggressive rehabilitation program that we choose to follow after ACL reconstruction.
II. The donor site problems after ACL reconstruction are not due to a patellar tendon shortening but are probably multifunctional (muscle atrophy – loss of proprioception changes to the mechanical properties of the residual patellar tendon).
III. The use of the mid-third of the patellar tendon in ACL reconstruction still remains a reliable method.

1999 Current AMA Views on Euthanasia

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Euthanasia – The AMA Council on Ethical and Judicial Affairs (CEJA) has repeatedly expressed its opposition to a physician intentionally causing the death of a patient. As stated in the Council Report A (A-77) adopted by the House of Delegates: "The intentional termination of the life of a human by another – mercy killing – is contrary to public policy, medical tradition, and the most fundamental measures of human value and worth."

Withholding or Withdrawing Life Support – In regard to the withholding or withdrawing of life prolonging treatment or the alleviation of severe pain in a terminally ill or irreversibly comatose patient, the AMA believes that this should not be characterized as euthanasia. The intent of withholding or withdrawing life support is to relieve the patient of the burden of treatment or suffering, not to kill the patient.

Treatment of Patient – In deciding whether the treatment is beneficial or burdensome, the AMA feels that the decision should be made by the physician. In Opinion 2.20 of the AMA Code of Medical Ethics it is stated that the preferences of the patient should prevail unless is clearly established that the patient is terminally ill or irreversibly comatose. The physician should not be deterred from appropriate aggressive treatment of the patient. There are adequate safeguards to confirm the accuracy of the diagnosis of irreversible coma. In situations where death is not imminent, but a patient's coma is beyond doubt irreversible, it is not unethical to discontinue all means of life prolonging medical treatment. This includes medication, artificially or technologically supplied respiration, nutrition, or hydration.

Patient's Preferences – According to the AMA, the patient's preferences may be communicated through a document called "the living will" and also by appointing an individual with "Health Care Power of Attorney".

- A competent adult may, in advance, formulate and provide a valid consent to the withholding or withdrawing of life support systems in the event that injury or illness renders that individual incompetent to make such a decision – "the living will".
- The legal provision of a designated "Health Care Power of Attorney" can serve as a highly recommended method for supplementing the "living will". This provision provides a process to address situations not covered in the "living will".

1999 Traumatic Instability of the Biceps Brachii - Causes and Natural History

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Acute or chronic anterior shoulder pain may be due to a primary lesion of the proximal biceps tendon. The special anatomical characteristics of a painful biceps tendon are an irritated synovial sheath, a variable sized bicipital groove, a tear of the transverse biceps ligament, or entrapment of the tendon by the coracohumeral ligament. Also, alteration of the intra-articular segment of the tendon may cause pain. Painful receptors may be mechanical or chemical or nonmyelinated nerve fibers. Also, nociceptors in collagen tissue or cytokinins, crystals, prostaglandins A and B, and other oxidants, may stimulate pain receptors and result in acute, sub-acute, or chronic pain. As the acute phase subsides, physical activity and collagen stiffness cause varying degrees of pain at different times of day and night depending on activity, prolonged rest, and collagen elasticity. Differential diagnosis: the major lesions to be considered in a patient with acute anterior shoulder pain with known trauma or misuse, include acromioclavicular separation, subacromial bursitis, supraspinatus calcification or tendinitis, acromial impingement syndrome, a rotator cuff partial or complete tear, a coracoid impingement lesion, and "tendinitis" around the coracoid process. In younger patients, a lesion of the glenohumeral labrum or a ligamentous injury may occur; in older patients, pain may be due to any of the items mentioned or glenohumeral arthrosis. Diagnosis: an acute lesion causes anterior pain with digital pressure in the deltopectoral groove; internal and external rotation of the humerus in 10° of flexion results in pain associated with popping and snapping of the tendon; a painful popping and snapping may also be associated with internal rotation of the humerus and adduction of the arm across the anterior chest while the patient is attempting to grasp or pull an object. Other activities of daily living that are painful are: (a) the shoelace tying test which causes pain as the lace is tightened; (b) placing the involved extremity in a shirt sleeve or in a suit coat; (c) tightening the seatbelt as the left arm is moved across the chest; or as the right arm adjusts the short side of the seatbelt; (d) forward lifting while the arm and the elbow are each flexed 30° and the forearm is supinated results in pain as resistance is applied to an upward motion (J. Spencer Speed Test); (e) as one gets up from a deep chair by placing the hands on the chair arms, anterior shoulder pain occurs; (f) as the patient stands in the door frame with open palms against the frame, pain occurs as force is applied to the frame as the extremities are moved upward to an overhead position against the frame. This particular maneuver is painful. In the acute phase of bicipital tendinitis, pain diminishes spontaneously by the week. Plain radiographs of the shoulder area provide additional positive or negative information relative to the osseous or cartilaginous structures. The diagnosis is confirmed and localized by an anterior extra-articular injection of 1% Xylocaine. This injection momentarily diminishes biceps pain, but will not affect pain caused by other shoulder lesions. The diagnostic maneuver that is consistently positive and painful and provides both quantitative subjective pain complaints and objective localization is done by the patient placing the humerus in maximum extension, adduction adjacent to the side of the chest, and the elbow is in acute flexion with the forearm in supination while the biceps is voluntarily contracted. The severity of pain is graded on a visual analogue scale 1/10 as minimal and 10/10 as severe. In the acute phase, pain may be 10/10. After a few weeks, fibrosis occurs, pain severity diminishes so that by four weeks after the original onset, maximum pain severity may be 6/10 and may decrease to 2/10. The activities of daily living are much less painful than initially. Tendon snapping and popping indicate persistent instability of the biceps tendon and its relationship to the bicipital groove. Internal rotation of the humerus and pronation of the forearm usually result in a painful pop. Night pain is a frequent complaint during the first few weeks of the painful biceps syndrome. Relief occurs almost immediately as the involved extremity is placed in full overhead abduction with the elbow flexed and forearm supinated while the patient is lying on the involved side with a small pillow under the head. In those patients not operated upon, pain severity diminished as fibrosis occurred and as stability of the tendon increased. Simultaneously, activities of daily living were less painful and improved. By six months after the initial incident, pain varied on a day to day basis from 1/10 to 5/10 with the most severe discomfort occurring during the humeral extension, elbow flexion – biceps contraction test. Clinical results: the senior author reviewed the records of approximately fifty patients with a localized biceps tendon syndrome diagnosed by history and clinical assessment and treated during the past twenty years. Approximately thirty patients were treated nonoperatively and the senior author was in that group with involvement of both his right and left biceps tendon at different times. The remaining twenty patients of the total of fifty were operated upon since they requested a rapid recovery and assurance that the lesion was stabilized at the time that the intra-articular segment of the tendon was removed. Five of the twenty patients were treated by transfer of the biceps tendon to the coracoid process after detaching the tendon from the glenoid and by

redirecting the entire tendon out of the bicipital groove and away from the coracoacromial ligament to the soft tissue over the coracoid process. Current practice: Motley and Speer[1] currently recommend tenotomy of the biceps tendon at the glenoid attachment, removal of the intra-articular segment of the biceps tendon, and recession or stabilization of the distal tendon by soft tissue entrapment or by anchoring to the coracohumeral ligament where there is adequate restraint to prevent an unsightly bulge of the proximal muscle belly. REFERENCES: Motley, G.S.; Jones, C.K.; Langeland, R.H.; Holovacs, T.F.; Speer, K.P.: The Intra-articular Subluxation of the Long Head of the Biceps Tendon, Arthroscopy Journal, submitted 1998.