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Spine Pain in Swimmers: Possible Causes and Treatment Strategies

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Why Swimmers?

If you've made it this far in the article, keep reading whether you treat swimmers or not. The purpose of this discussion is twofold. One, to increase the awareness of spine related pathology that may be present in competitive swimmers. Two, to help develop effective treatment plans for postural dysfunction and related pathology whether the person is a competitive swimmer or an office worker. As this discussion unfolds, you should be able to take the concepts of treatment and apply them to your non-swimmer population

Most elite competitive swimmers are engaged in heavy training by age 10. As a result, we easily see the results of dysfunctional posture on the spine. The spine of a competitive swimmer who started competing at age 10 may demonstrate (by x-ray) the forces that have been applied to it by age 15-20. This is probably because of the plasticity of the spine at younger ages. This information may shed light on what "non-swimmer" and older, less plastic spines may be feeling, but cannot yet be detected by current diagnostic technology.

Knee and shoulder injuries seem to be the most frequently reported injuries in competitive swimmers but current research is demonstrating more spine pain than has previously been noted. Drori et al. reported 50% of butterfly and breaststroke swimmers experience low back pain by age 17. Verni et al. reported that 80% of symptomatic (low back pain) swimmers showed radiological abnormalities and 52 % of non-symptomatic swimmers demonstrated radiological abnormalities.

Spinal dysfunction is certainly not limited to the lumbar spine. The most popular injury in swimmers is considered to be an overuse injury to the shoulders. As more attention is given to the effects of swimming on the cervical and thoracic spine, we may find that there are less actual shoulder problems and more mid cervical and upper thoracic problems

What's wrong with swimming?

Any activity with great repetition is bound to have negative effects. Swimming is no exception. Although the buoyancy offered by being in water decreases the compressive loading seen in many other sports, dysfunctional spine postures are reinforced. Here lies the problem. Although this is somewhat of a generalization, if we look at each area of the spine while swimming, we would see these positions repeated:

Lumbar: lumbar extension, extension and extension (full flexion during flip turns)

Thoracic: increased kyphosis with emphasis to development of the pectoral muscles and latissimus dorsi
Scapula: protracted and elevated

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Notes from the Editor

This issue highlights the program presented by NAIOMT faculty David Deppeler at the 2001 Symposium in Colorado Springs entitled Spine Pain in Swimmers. David incorporates his knowledge as a manual therapist and experience as a competitive collegiate swimmer to provide the reader with a better understanding of this subject.

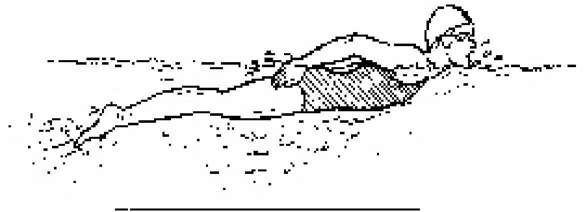
Brian Macks, NAIOMT residency graduate from Warren Michigan, summarizes the history and present status of manipulation in the United States. Brian is an advocate not only in Michigan but nationally on the topic and presents information that I am sure you will find both enlightening and useful in your practice as a manual therapist.

Mary Chavin, NAIOMT Central Administration Coordinator, gives an update of the new online exam process which we have been piloting since January. Shari Keyser, Examination Coordinator, describes the oral/practical scheduling for the next year for those planning on taking the level III and/or IV exams.

Bill Temes, Editor

Swimmers cont. from page 1

Mid cervical: extension
Upper cervical: extension



CT junction: "confused" pulled into flexion from the scapular position although it would like to extend with the rest of the cervical spine. This region is probably subject to repeated compression.

Breathing is another aspect of swimming worth noting. Because of the vary nature of swimming, breathing is done through the mouth, instead of the nose. It seems that the upper respiratory muscles (scalenes, intercostals) are used more than the lower (diaphragm). This leads to hypertonus of the upper thoracic area which may also promote the forward slumped posture (as the swimmer will naturally positions themselves away from the tightness in their upper back).

How do these postures affect the spine?

If we look at each area of the spine separately, we can see the effects of the forces mentioned.

In the Lumbar spine, a swimmer may complain of unilateral (more than bilateral) low back pain, pain at end ranges of flexion/extension, occasional LE radiating pain (Nyska).

There may also be evidence of a lateral shift and "catch" type pain. Possible causes may include spondylolysis, (Nyska), spondylolisthesis, lumbar instability, facet joint injury, and muscle imbalance between the abdominal (hypotonus) and back muscles (hypertonus). It seems that the posterior bony structures are the primary target of dysfunction.

In the Thoracic spine, pain may reported with sitting, bending backward, prolonged positions and with shoulder motion. Possible causes may include Scheuerman's disease and most common, muscle imbalance between the pectorals and back muscles as the scapula learns to function in a protracted position (tight pectorals, SCM, levator scapula, upper traps, etc.). Upper thoracic segmental mobility may be limited in extension or may be hypermobile.

The Cervical spine symptoms can include unilateral catch type neck pain, headaches, jaw pain, ringing in the ears, face pain, shoulder pain, etc. Possible causes may include cervical "instability" as C2,3 or mid cervical segments (C5,6) take the brunt of the ill forces from upper cervical extension tightness, levator scapula, anterior scalene and SCM tightness. Facilitation of the trigeminal cervical nucleus can occur, especially if C2,3 breaks down. Other wise, it seems that most of the pain comes from a combination of mid cervical facet hyper and hypo mobility.

What can I do for these conditions?

Here are some general treatment strategies for the above mentioned conditions. Each condition is worthy of its own article but this should get you going in the right direction.

<u>Lumbar - spondylolysis</u>

- Rest/support. If a spondylolysis is found, a Boston brace may be worn for 3 months, decrease training intensity for 6 months. (Nyska)
- Decrease hamstrings, calf, erector spinae and hip flexor tone
- Increase core stability: multifidus, pelvic floor, and deep transverse abdominus (biofeedback "Stabilizer")
- Improve body mechanics in the water by teaching

<u>Scapular –altered position</u>

- Decrease pectoral, upper traps and glenohumeral rotator tone

- Improve scapular position and stability on dry land by training and improving recruitment of serratus anterior and low traps
- Increase upper thoracic mobility into extension
- Improve body mechanics in the water (?). This is tough one as the protracted scapular position helps the swimmer recruit power from the pectorals while in the water. It may simply be that we work to improve dry land postures and do not attempt to alter positions in the water.

Cervical – mid cervical instability

- Decrease upper cervical, scalene, SCM, pectoral tone
- Increase segmental mobility: posterior mobilization of OA, rotation and extension of the CT junction
- Correct breathing when they are not in the water. (Don't try to have a swimmer breath differently while in the water, it will not work).
- Increase cervical stability through longus coli recruitment (biofeedback "Stabilizer")
- Improve body mechanics in the water by teaching axial extension in the water

Conclusion

A portion of rehab for the swimmer may involve improvement of posture while in the water (lumbar, cervical). Other postures cannot be realistically changed (scapular position, thoracic spine and breathing patterns). It may be that the best a swimmer can do is perform dry-land exercise behind the scene in an attempt to increase a "margin of error". This will allow them to get a way with potentially harmful postures in the water.

Swimming is frequently referred to as a gentle environment for spine pain and still recommended as effective exercise for low back pain. Closer investigation of competitive swimmers may prove useful in understanding which spine conditions may potentially be helped or harmed by lap swimming. This information does not apply to water aerobics or other non-swimming exercises in the water.

Diagnostic work up in this population may be useful to help us understand the effects of repeated "ill" forces to the spine. The more we look at the spines of competitive swimmers, the more we see pathology that seems related to posturing in the water. The young competitive swimmer may be exhibiting radiological changes that an adult non-swimmer spine may not demonstrate but may feel when similar positions are repeated.

**The clinician must always be suspicious of pain in children and special attention should be given to differential diagnosis (rule out pathological fractures, tumors, infection and other nasties).

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* *All drawings from Hannula

EXAM PROCESS UPDATES

Oral/ Practical--Levels III & IV

Dear NAIOMT Certification Candidates:

You may have come to realize that NAIOMT is in an acute growth phase. As with any Institute experiencing growth, there are adjustments that need to be made by the Institute to accommodate the increasing numbers of students interested in its programs. We want to thank you who have shown patience and understanding. NAIOMT is working hard toward addressing your needs,

Regarding the Oral Practical Examinations, we have recently seen an unusually high demand for the level III and level IV examinations in the Northwest. I expect this demand will ebb and flow, but generally will continue to increase steadily Our June 2002 examination filled with the maximum candidates for a one-day examination, with some individuals being placed on a waiting list. NAIOMT is sensitive to the disappointment of those unable to get into this examination and have addressed this concern by organizing a Seattle Oral Practical Examination for level III candidates. The examination date is November 7, 2002. Please contact NAIOMT Examination Coordinator for space availability.

NAIOMT has held an Oral Practical Examination in Warren, MI for the past few years. As long as we have enough candidates to hold this examination, it will continue to be held in April each year. Spots are limited; therefore registration with the recommended non-refundable deposit is necessary to reserve a space. NAIOMT also holds an annual Oral Practical every June. This Oral Practical is held during our Annual General Meeting; therefore the availability of increased faculty members allows us to hold an examination that can accommodate more candidates. Sending in the application with a non-refundable deposit will reserve a spot. This examination rotates between Colorado, Portland and Seattle. The examination date and location is determined at the end of June each year.

If a number of candidates want an examination held in their region, there are certain criteria that need to be met before this can be scheduled. These examinations need to be held the day before or after a NAIOMT course held in your city/region. Generally these examinations require eight candidates to meet the financial requirements. This varies however depending upon many factors, such as the cost of examiner flight/s, hotel stays, facility costs, etc. NAIOMT Examination Coordinator will provide you with budgetary information. It is recommended that interested candidates make a list of names, phone numbers and fax numbers of individuals in the same area that are firmly committed to an examination and willing to make a non-refundable deposit. The next step is to find a facility willing to hold an examination on a pre-set date that has the equipment and space to adequately handle an examination. A contact person willing to coordinate the examination in your area is also needed. Please do not hesitate to contact Shari Keyser at 541 344-4777 to discuss details.

Online Written Pilot Program

Since January of this year we have offered the opportunity to about 10 classes to participate in the new online style exam pilot project. We want to express a very big thank you to those students who participated. Without you we could not have learned all that we did to help institute this new and improved exam process.

Some aspects of the online exam process worked very well, some need some tweaking, and some things will have to be changed. That is what you hope to gain from a pilot. Overall, the process of signing on and taking the exam seemed to be easier than students were anticipating. There was confusion, as is expected with any change, over parts of the registration process. But overall, I, the administration, and students feel this will be a big step forward when we can get the final system up and running.

Given that we now have to step back and do some redesigning of the registration process, exam taking process, and complete gathering a bank of questions, we are going to aim for a target of offering the online exam option in early 2003.

We apologize to those who were hoping to continue with the exams this year, but it is essential that we set this up correctly, and must take the time to do so.

The online exams will initially be offering covering Levels I and II and expect to offer them in early 2003. Level III & IV will be added at a later date. Students will have the option for a time to either chose to do the online exams for those levels, or do the traditional style Level II written. We are expecting to offer one exam day a month, with the exams for both Level I and II offered. A student could take any of those that they have registered for in advance. Each Level's exams will include a CAT (Course Assignment Test)--which covers material learned prior to that Level, and a PCT (Post Course Test)--which will consist of 70% information learned in the course, 30% previous material. Those scores will be averaged with the CAT weighted at 30% and the PCT weighted at 70% to give you your final score for that Level. To complete certification you will have to complete exams for all Levels.

The object of going to this style of examination was for ease of use for the student, having the exams cover smaller amounts of material, and encourage more people to consider certification. We know that change is never easy, and we appreciate your patience as we go through the transition.

Manipulation by Physical Therapists In the USA

Brian Macks PT, COMT, OCS

Manipulation by Physical Therapists in the United States of America has a long and varied history. Currently there are multiple orthopedic manual physical therapy programs active in the country that teach mobilization and manipulation. This document has been written to aid in the education of key groups in America regarding the scope of physical therapy practice including manipulation.

Historical Perspective

- Physical therapists have been performing manipulation since the beginning of the profession (Karl Kranz, DC, report to the American Chiropractic Association). The literature has been recording this particular physical therapist intervention since 1928.

- Manipulation has been developed along several separate and parallel pathways between physical therapy, chiropractic, and other professions due to the different emphasis placed on it by the respective professions.

- Manual therapy: Chiropractors call it "adjustment/manipulation" to relocate vertebral position [subluxation]. The Chiropractic journal Manipulative Physiological Therapeutics frequently publishes research/case studies on the benefit of manipulation for medical conditions such as asthma, ear infections, colic, and bed-wetting. Manual Therapy by Physical Therapists is applied simply to restore normal joint motion.

- Manipulation has developed within Physical Therapy and as such constitutes a part of Physical Therapy.

- Physical Therapy has historically used the terms mobilization and manipulation interchangeably as is evident by their definition within the Guide to Physical Therapist Practice:

  Mobilization/Manipulation: a manual therapy technique comprised of a continuum of skilled passive movements to joints and/or related soft tissues that are applied at varying speeds and amplitudes, including a small amplitude/high velocity therapeutic movement.

- The Federation of State Physical Therapy Boards' Model Practice Act for Physical Therapy includes: Alleviating impairment and functional limitation by designing, implementing, and modifying therapeutic interventions that may include, but are not limited to…Manual therapy techniques (including mobilization and manipulation).."

Research

The landmark publications supporting the efficacious use of spinal manipulation are the RAND and AHCPR studies. The American Chiropractic Association advertises that these studies support chiropractic manipulation. In reality, physical therapists provided spinal manipulation in more reports of clinical trials than those involving medical doctors, chiropractors, and osteopaths. Physical therapists performed manipulation in twice the clinical trials as chiropractors and four times the number involving osteopaths. Physical therapists therefore provided the major evidence on spinal manipulation in these heralded studies. These studies also support the application of manipulation across professions including medicine, osteopathy, physical therapy, and chiropractice.

Safety

- Malpractice Reports: Maginnis and Associates, the group that provides Professional Liability Insurance for physical therapists through the American Physical Therapy Association (APTA), has reported that no specific losses can be attributed to "manipulation or high velocity thrust". CNA Health Pro reported to the APTA in March of 1999 that they had conducted a review of their national claim file (600 cases) and found only three claims that mentioned manipulation (two claims occurred in 1993, one was closed with no payment; one claim was filed in 1997, they did not report whether a payment was made).

- Virginia Board of Medicine's Study of Spinal Manipulation: (see reference above) This study was prepared for the Chair of the Senate Committee on Education and Health in the State of Virginia. This study recommended that restricting Physical Therapists from performing manipulation is unwarranted owing to Physical Therapists' education and clinical training in the area of manual therapy, and that there is no public risk to warrant a restriction.

- New York State Education Department's Opinion on Physical Therapist Manipulation: This State of New York regulatory body issued an opinion that stated that Physical Therapists have been performing manipulation safely and within the scope of Physical Therapist practice for at least 19 years.

- Dr. Shekelle, co-author of the landmark RAND study, states, "There is no credible data to support a conclusion that any provider is more or less safe than any other provider in the delivery of spinal manipulation. The data doesn't exist, and without it, no provider type can credibly claim that there is solid evidence for greater safety."

Education

Physical Therapy manipulation intervention is based on evaluating and promoting normal joint movement and/or pain control to the spine and extremities.

The tool to provide a standard rating for safe competency in manipulation is based on the practice model and training for the respective profession and related anatomical/physiological tenets. Competency based education including scope of practice and safety is the foundation of physical therapy and all physical therapy related interventions in treatment across any minimal to severe human pathological states. Issues of manipulation practice and safety can not be validly challenged, compared, rated, or standardized interprofessionally in the absence of interprofessional cross competency.

The Normative Model of Physical Therapist Professional Education includes manipulation as course content and

skill acquisition components. The Normative Model is used by educational programs in America to determine necessary course content for the physical therapy curriculum and details the educational outcomes for the graduate to achieve in many areas, including intervention. Included in the section on intervention are educational outcomes related to safe practice and skill acquisition.

Physical Therapy Professional Programs all include manual therapy as part of their physical therapy curriculum. Those schools that are state supported receive state funding through appropriation bills passed by that particular state's Senate and House of Representatives and signed into law by that state's Governor's office.

Other methods by which American physical therapists can acquire additional clinical competence in manipulation include:

- Post-professional degree programs like that available from Andrews University that offer extensive didactic and clinical training in manipulation.
- Post-professional continuing education, certification, and clinical fellowship programs that are approved by the American Academy of Orthopedic Manual Physical Therapists and credentialed by the American Physical Therapy Association such as the North American Institute of Orthopedic Manual Therapy.
- Orthopedic Certified Specialist certification through the American Board of Physical Therapy Specialists certifies Physical Therapists in the United States in Orthopedics. Manual Therapy is recognized as a subspecialty of Orthopedics. The minimum eligibility requirements include at least 2000 hours of direct patient care in orthopedics or evidence of completion of an accredited clinical residency/fellowship program and passage of a written examination of advance knowledge and clinical skills.

The degree awarded to American Physical Therapists is a Masters of Physical Therapy. Several Doctor of Physical Therapy professional programs have been in existence for a number of years. Many educational programs in the United States are in the process of transitioning to a DPT degree. Program accreditation is granted through the Commission on Accreditation of Physical Therapy Education (CAPTE). CAPTE is the only recognized agency in the United States for the accreditation of physical therapy programs. All American physical therapy programs are accredited through CAPTE. Graduation from an accredited physical therapy education program is one of the necessary requirements for state licensure. Additionally, states require licensure applicants to successfully pass the national physical therapy examination which has been jointly developed, and is jointly administered and scored, by the Federation of State Boards of Physical Therapy and the Professional Examination Service. In the accreditation process, CAPTE uses the Evaluative Criteria for the Accreditation of Education Programs for the Preparation of Physical Therapists. Topic areas include, but are not limited to, communication, critical inquiry, and decision-making, professional development, examination, plan of care, intervention, prevention and wellness and social responsibility. Manual therapy techniques can be found in the intervention section.

Concluding Comments:

Physical therapists in America have been competently trained in the knowledge and skills that are required to provide safe manipulation interventions since the beginning of the profession. Much research on manipulation has been provided by Physical Therapists. American Physical Therapists have a solid record with no history of public complaints before State Boards of Physical Therapy and have the benefit of an outstanding, complete education and a solid safety and malpractice report from the physical therapy malpractice insurance industry. The public health, benefit, and welfare are strongly served by the Physical Therapy profession in America.

Commentary

NAIOMT-trained Physical Therapists may live in states that will undergo legislative challenges to our right to use manipulation interventions with our patients. A successful defense of Physical Therapy scope of practice relies on those clinicians that actually perform manipulation. Education is the key. Membership in your APTA state chapter is critical to making your message credible. We cannot be one-issue manual therapists. There are other issues for all Physical Therapists in your state. Your support of others concerns will garner their support for the protection of Physical Therapist manipulation. Next, identify the key decision-makers and committees. You need not run for office to influence policy making in your state chapter. The most common venue to help out your state chapter and also make your message heard is by joining the Legislative Committee. The state chapter and district board of directors and general membership meetings offer an excellent opportunity to educate those Physical Therapists that are most active in the profession. A manual therapy round table can be facilitated by you at annual state conferences. The legislators in your own district need to hear about the Physical Therapy profession from you (not a lobbyist). Invite them to lunch, write or email them a letter, or invite them to meet you at the state chapter's annual legislative event.

Your state may need a manual therapist to testify at a legislative hearing about Physical Therapist manipulation (see Appendix A). NAIOMT-trained manual therapists are well versed in the knowledge necessary to field questions from state legislators. A successful testimony requires preparation. The various references listed in this article should be obtained, studied, and presented if need be to the legislators at the hearing Having copies of these publications bookmarked and ready to go makes your testimony that more powerful; for example, Dorland's Illustrated Medical Dictionary, 25th edition, full size (not pocket size), is a great book to show a legislator with its definition of manipulation: "skillful or dextrous treatment by the hand. In physical therapy, the forceful passive movement of a joint beyond its active limit of motion.". The various heads of practice at the American Academy of Orthopedic Manual Physical Therapists, Orthopedic Section, APTA, and the APTA are excellent resources. The APTA State Government Affairs director and manual therapists in those states who have been challenged are also good resources. [A note about creating a position verses a position statement on manipulation. A position will be easier to use in that it does not have to be approved by the state chapter board of directors and thus can be easily amended as needed to reflect the current legislative strategy.]

The presentation needs to be customized to a state's Physical Therapy and manual therapy educational program mix. All of the AAOMPT programs operating will need to be identified and an understanding of what they are offering will be needed. The same will have to happen for all of the state university and college professional and post-professional programs. One of the common challenges to our right to manipulate is an invalid challenge based on the number of hours of training for Physical Therapist manual and manipulative therapy. Though the argument may be invalid, you should know how many hours of training we receive. Knowledge of the hours in the NAIOMT program should be well known (like all AAOMPT member programs, a minimum of 1500 hours is required for graduation). The professional and post-professional hours in the state university and college programs needs to be added to the total. The Program in Physical Therapy, School of Health Sciences, Oakland University, in Rochester, Michigan has a total of 3923 contact hours completed by professional program graduation. The Physical Therapy Department, School of Health Professions and Studies, University of Michigan-Flint, in Flint, Michigan has a total of 4491 contact hours completed by professional program graduation. The training specific to manual therapy techniques is 1742 hours for Oakland University and 2364 hours for the University of Michigan (the clinical education portion of these totals is 1040 hours for Oakland University and 1200 hours for the University of Michigan).

The State Board of Physical Therapy needs to be contacted to determine if any disciplinary activity has occurred as relates to manipulation. This can be easily accomplished in many states by simply going to that particular Board's website.

In summary, knowledge is power. And who better than a North American Institute of Orthopedic Manual Therapy trained Physical Therapist to explain and defend our use of manipulation interventions?!

Appendix A:
MICHIGAN PHYSICAL THERAPY ASSOCIATION
POSITION ON MANIPULATION

Manipulation is a procedure that is performed as a part of a broader area of health practice known as Manual Therapy. Manipulation, as the term implies, is the skillful movement of body tissues by someone other than the patient. These tissues may include muscle, other soft tissue, or bone. Manipulation of these tissues is performed in such a way as to achieve a desired effect such as increased movement, reduction of muscle spasm, decreased discomfort, removal of impingement, or stretching of tissues. Manipulation is a procedure that is generally used as a part of a larger treatment plan designed to improve or restore function.

The use of manipulation is widespread among health care professionals. It is a common procedure used by Medical Doctors (MDs), Doctors of Osteopathy (DOs), Physical Therapists, Podiatrists, Dentists, and Chiropractors. It has been a part of the practice of Physical Therapy since the origin of the profession at the turn of the century. At a March 1, 2001 meeting, the National Association of Chiropractic Medicine, the American Osteopathic Association, the American Physical Therapy Association, and the Veterans Health Administration acknowledg[ed] Spinal Manipulative Therapy is not the sole purview of any one group or profession. Spinal manipulation is a form of manual therapy that is used by chiropractors, physical therapists, osteopaths, and medical doctors. There are no clinical trial data to support a claim that spinal manipulation delivered by chiropractors is more effective or less risky than spinal manipulation delivered by any other type of practitioner.

All of the State of Michigan supported Physical Therapy schools are required to teach these skills as a part of the basic curriculum. Continuing education, post-professional residencies, and advanced clinical degrees are available for those Physical Therapists who wish to pursue additional skills above and beyond those that are required to practice in this area.

A recent review performed by Maginnis & Associates, one of the largest malpractice insurers for Physical Therapists, showed that there have been no cases brought against Physical Therapists for the use of this procedure. Likewise, a review of activity by the Michigan Board of Physical

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