WITHOUT KIDNEY’ING AROUND...
RE PRODUCING THE DOCTOR’ED MALE AND FEMALE FOCUS ON GOOD BODY MECHANICS AND ERGONOMICS

...Taking Care of Your Darn Self!!
I do not have any affiliation (financial or otherwise) with a commercial organization that may have a direct or indirect connection to the content of my presentation(s).
At the end of this session, participants will be able to recognize and incorporate appropriate measures to address biomechanical positioning and ergonomic concerns within an Operating Theatre or Computer Workstation.


References

- https://www.youtube.com/watch?v=gmAFvHn4UQ - Ergonomics in the Operating Room: Protecting the Surgeon 20/6
Musculoskeletal Injury

- Definition: Injury or disorder of the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissue

- FOCUS OF THIS PRESENTATION IS ON AVAILABLE RESEARCH/INFORMATION RELATED TO POTENTIAL MSK INJURIES AND ERGONOMIC SOLUTIONS RELATED TO UROLOGY/ONCOLOGY SURGEONS AND THEIR PRACTICES
NEUTRALIZE POSTURES

TYPICAL BAD POSTURE
Tight muscles pull the skeleton out of alignment, creating an awkward and unhealthy posture. Muscle aches and pains are common for this person.

- The muscles at the back of the neck become tight and cause the chin to protrude forward.
- Tight chest and shoulder muscles pull the arm close together, causing the chest and shoulders to round forward.
- A tight lower back causes the pelvis and abdomen to tip forward, making the stomach appear pot-bellied.
- Poor pelvic alignment causes tight hamstring, a major contributor to lower back pain.
- Tight front of hip muscles push the knees backward, shifting the center of gravity back into the heels.
- The shift back in the center of gravity causes the calf muscles to tighten.

IDEAL POSTURE
The head aligns over the pelvis, the shoulders are back, and the muscles are balanced, giving a sleek, streamlined appearance.

- The neck muscles are lengthened so the head aligns over the pelvis.
- The shoulders are back, which frees the rotator cuff areas and encourages deep breathing.
- Lumbar vertebrae are in neutral, preserving the curve, the "springboard" of the lower back.
- The pelvis is upright and aligned over the arches of the feet.
- The waist is lengthened, which flattens the stomach.
- The knees are supple because body weight is centered so there is no strain on the knees.
- The ankles are flexible because the muscles are no longer unbalanced.
Awkward Postures: Back

- FULL FORWARD FLEXION - 2.5-3 TIMES THAT OF STANDING (250-300% LOADING)

- AS WELL AS PUTS TENSION ON POSTERIOR LIGAMENTS

The inter-vertebral discs lie between the vertebral bodies, separated from them by a thin cartilaginous endplate and consisting of two main regions, the nucleus pulposus and an outer, firm, collagenous annulus fibrosus.

The role of the inter-vertebral discs is mechanical. They are the joints of the spine, enabling it to bend and twist in all directions.
Active Abdominals

- Helps support your back
  - Makes you stronger!
- Bring stomach in slightly & contract like you are coughing
  - Remember to breathe!
- Contract BEFORE moving and HOLD until finished
Body Mechanics and Ergonomic Positioning

PEEKABOO!!
Identifying Risk Factors

- Awkward Posture (deviation from ideal working posture)
  - Reaching behind
  - Twisting
  - Working overhead
  - Kneeling
  - Forward/Backward bending
  - Squatting

The (lack of) ergonomics of urological endoscopic surgery place urologists at risk for potential injury. The amount of neck flexion or extension performed, the amount of shoulder adduction or abduction used, and stability of the upper extremities during surgery; which are maintained in a prolonged static posture; are the main risk factors. All these constraints may lead to muscle and joint fatigue, pain, and eventual musculoskeletal injury. Furthermore, these issues may impact surgical accuracy.

Sallami et al 2012 La tunisie Medicale - 2012 ; Vol 90 ( n° 012 ) : 843 - 846
In particular, more than 80% of surgeons worldwide suffer from some form of musculoskeletal distress. The majority of surgeons take analgesics to relieve symptoms. Relevant guidelines concerning different parameters in the operating room exist but unfortunately only about 11% are aware of Operating Room Ergonomic Guidelines and only 3% apply them. No preventive program (NPP) regularly continued the daily working activity without any type of intervention. Preventive program (PP) intervention consisted of planned and supervised exercises. Ergonomic principles applied during surgery and the exercises were performed before and after the surgical procedures.

This randomized trial demonstrated the effectiveness of a global educational program in the prevention of WRMSD among surgeons. The association of simple specific self-treatment exercises and ergonomic education, in collaboration with a Physical Therapist, significantly improved quality of life after 3 months, and decreased low back pain and overall analgesic consumption after 6 months from the beginning of the program.
EXERCISE PROTOCOL FOR PP GROUP

- SQUATS
- ALTERNATE SHOULDER EXTENSION - WITH ARMS ABOVE/BELOW SHOULDER HEIGHT
Variables For Ergonomic Correction:

- Correct Monitor Height/Position
- Correct Table Height
- Correct Placement/Position/Use of Foot Pedal
- Correct placing of the equipment and the surgical team (tripping/contact overhead equip)
- Correct Lead Apron
- Use of Anti-Fatigue Mats
- Appropriate Footwear
- Use of Footrests, Chairs and Sit/Stand Stools for micro-breaks

ERGONOMICS & COMMONLY AFFECTED AREAS RECOGNIZED FOR ORTHOPEDIC/MSK DISCOMFORT

- Low Back 75%
- Neck 79%
- Shoulders 51%
- Upper Back 59%
- Wrist/Hand 26%
- Low Back 75%

“A Preventative Program for Work-related Musculoskeletal Disorders Among Surgeons” 2015 Silvia Giagio, PT, Giovanni Volpe, PT, Paolo Pilliastriini, PT, MSc, Giuseppe Gasparre, M Antonio Frizziero, MD, and Francesco Squizzato, MDz
ERGONOMIC ISSUES IN THE OPERATING ROOM

Five Ergonomic Problems Mainly Faced by Surgeons in the Operating Room...

1. Hand Held Instrument Design
2. Operating Table Height
3. Number and Placement of Monitors
4. Foot Pedal Use and Placement
5. Body Support to Relieve Static Posture
Group 1 (dissection forceps, grasping forceps, scissors and needle holders) is recognized as causing the most discomfort - Scissors Model, Pistol Grip, Thumb Manipulation most commonly used.

Considerations
- Use foot pedal for diathermic or ultrasonic equipment to reduce repetition and use of hands and to also break up static postures
- With respect to general hand pain, neuropathy or discomfort...Surgeons who preferred counterintuitive Ureteroscope deflection were significantly more likely to have problems (56%) compared with intuitive users (27%) or those with no preference (26%) Kelly A. Healy Nov 29, 2011
OPERATING TABLE HEIGHT

• Too high of a table height places increase load in the shoulder girdle and creates a mechanical disadvantage

• Shoulder Abduction, Scapular Elevation stresses the Rotator Cuff, Upper Traps

• In some cases, mechanical compensation can occur at the wrist creating excessive excursion or deviations – nerve compression

• *Table Height* should be adjusted b/t 90-120 degrees of elbow flexion or instrument handles positioned at elbow height of surgeon

• Consider umbilicus/naval height of patient as a reference point when filled with CO2

• Some tables do not provide adequate height adjustments (elevation/lower)

• The use of appropriate step stools (stacking option) be warranted for shorter surgeons when possible
• What Functional Movements patterns can be performed to mitigate risk?
  – Replicate motions that mimic or work in opposition
  – Use reciprocal inhibition to your advantage
CONSIDERED ONE OF THE MOST IMPORTANT ERGONOMIC FACTORS IN THE O.R.

Location/Height

Assisting surgeon easily at risk

Maintaining neck flexion greater than 15° to 20° for a prolonged period of time is an at-risk posture- prolonged extension is also detrimental
FOOT PEDAL USE AND PLACEMENT

Of 241 surgeons surveyed, 43.6% were not content with the foot pedal, for the following reasons:

- foot pedal contact was often lost
- a need was felt to look down at the foot pedal before they pushed the switch
- the wrong foot pedal or switch was sometimes activated unintentionally, resulting in potential danger for the patient
- they were forced to stand on one foot while manipulating the foot pedal. Liang et al July 31, 2013 https://doi.org/10.1371/journal.pone.0070423

CONSIDERATION:
If sitting in a chair/stool not an option, consider a lean stool or when possible alternate between sitting and standing to use the foot pedal
Features

- Height Adjustable Platform
- Support in Semi Stand/Lean
- Anterior Support at Chest
- Ability for use in minimally invasive (MIS) and open procedure

Chest Support-EMG shown to reduce muscle activity
- 44% Erector Spinae
- 20% Semitendinosus
- 74% Gastrocnemius

- Considered ideal for longer duration MIS where there is substantially less body movement and weight shifting and an increase risk of MSK fatigue

The most important design criteria were as follows:
- Support for the surgeon’s body in a natural working posture
- Suitable for use during both open and minimally invasive procedures
- Compact construction because of the limited space available around the operating table
- Comfortable and safe use of the product by both the P5 woman (5th percentile of short women) and the P95 man (95th percentile of tall men)
- Height-adjustable platform to solve the problems related to non-optimal working height
- Sufficient space for positioning of foot pedals for electrosurgery
- A product mobile by means of wheels.
POSTURE is essential in reducing MSK symptoms

- Static Positioning/AWKWARD POSTURE
- Foot Rest-Table Height-Reaching Across Patient
- Head Gear can increase load
- Recognize Personal Limitations
- IS THIS ERGONOMICS FOR ALL?
  - ENSURE THE WHOLE TEAM IS ERGONOMICALLY SOUND…
What Functional Movements patterns can be performed to mitigate risk?

- Replicate motions that mimic or work in opposition
- Use reciprocal inhibition to your advantage
Some of the Ergonomic Advantages

• Sitting position minimizes the physical stress of the surgeon and allows easy use of the foot pedals
• Surgeon sits at a central ergonomic position at the console independent of the situation in the operating field reducing the possibility of sustaining awkward postures
• Surgeon does not need to adapt to the handle of the instrument

Some of the Ergonomic Disadvantages

• Complete lack of tactile feedback – compensated by visual senses
• Assisting surgeon – The interference of the robotic arms significantly reduces the dexterity of the assistant
• A disadvantage of the motion scaling (2:1) is that the surgeon may need to move his arms long distances at the console for certain manoeuvres (e.g., pulling on a thread), which, in contrast, are easily performed during laparoscopy

Survey based on a questionnaire regarding neck and/or back pain sent out to surgeons performing prostatectomy:

- OPEN - 50%
- LAPAROSCOPIC – 56%
- ROBOT ASSISTED - 23%

In the robotic group, neck pain was overwhelmingly more common than back pain (21% vs 1%). This was due to the sitting position at the console while straining to optimally visualize the high resolution display.

Bagrodia et al J Endourol 2009;23:627–33

Proper Posture
- **Torso erect** – are you using the back rest when possible?
- **Feet comfortably on floor** – can reduce load into low back

Upper Extremity Position
- **Forearm rests comfortably on arm support**
YOUR COMPUTER WORKSTATION
Sitting Properly to Reduce Risk

HEDGE’S 3S’s IDEAL WORK PATTERN

- Move and gently stretch
- Stand in neutral postures
- Sit in neutral postures

For a 7.5 hrs day this gives a total of:
- 5 hours/sitting
- 2 hours of standing
- 0.5 hours of moving
- 16 sit-to-stand transitions

Every 30 minutes

Sitting: 8
Standing: 2
Stretching: 20

(http://ergo.human.cornell.edu/CUESitStandPrograms.htm)

Minimal bend at wrists
Top of monitor at eye level of just below
Monitor roughly arms length away
Document holder

Back straight
Elbows close to body 90° to 120°
Backrest supporting lower back
Adjustable swivel chair

Front of seat not pressing on backs of knees
Feel flat on ground or using footrest
1. What (along with good body mechanics and ergonomics) can reduce Work-Related Musculoskeletal Disorders among Surgeons?
   1. Exercise (predominantly aerobic) and ROM work

2. Name a RISK FACTOR associated with your profession?
   1. Awkward posture – prolonged static posture

3. Name an ergonomic item that may reduce the potential for an MSK injury that can be used in your profession?
   1. Hand held instruments used for intensely manipulating tissue that are specifically designed for their function (i.e. handles)

4. What is considered one of the most important ergonomic factors in the O.R.?
   1. MONITOR HEIGHT AND POSITION
Surgical procedures can be physically demanding and it is imperative to regularly engage in physical movement in order to perform our jobs safely.