Work Safety

Ergonomics in Obstetrics and Gynecology
Preventing Injury in OBGYN Ultrasound Practice

Presented by
Joan P. Baker, MSR, RDMS, RDCS
Carolyn Coffin, MPH, RDMS, RDCS, RVT
Seattle University
Seattle, Washington

Disclosures

Joan P. Baker, MSR, RDMS, RDCS

Relevant Financial Relationships:
• Sound Ergonomics, LLC Kenmore, WA
• Retired Professor, Bellevue College
• Retired Program Chair, Seattle University

Carolyn Coffin, MPH, RDMS, RDCS, RVT

Relevant Financial Relationships:
• Program Chair, Seattle University
• Sound Ergonomics, LLC, Kenmore WA

Learning Objectives

After completing this presentation, the learner will be able to:
1. Discuss the causes of musculoskeletal disorders in sonography
2. Identify injury-producing work postures
3. Describe work posture and work environment changes that would help minimize occupational injury risk

Lecture Outline

• Work-Related Musculoskeletal Disorders (WRMSDs)
• Risk Factors
• Solutions
  • Industry Standards for the Prevention of WRMSDs

Brief Overview

Take the time to do it right!
Historical Perspective

- Anecdotal evidence of WRMSD in sonography was established in the late 1970's
- 1985 was when the first published statement about "sonographer's shoulder" appeared
- Incidence:
  - In 1995 incidence was 81% in USA
  - In 2008 incidence was 91% in USA
  - In 2009 incidence was 83% in vascular sonographers

What Causes MSDs?

According to OSHA, this condition for any occupation is caused by:
- repetitive motions
- forceful or awkward movements
- duration of pressure
- overuse
- poor posture/improper positioning
- excessive force and strain
- vibrations

Factors Associated With MSDs

- Risk of injury depends upon:
  - Duration of exposure
  - number of years in the profession
  - Frequency of exposure
  - number of studies performed
  - Intensity of exposure
  - Combinations of risk factors

Tasks That Cause Symptoms

- Repetitive movements
  - lack of exam variety as seen in high-risk obstetrics (OB)
  - follicle studies
  - gynecologic (GYN) endovaginal studies
- Awkward movements
  - bedside exams
  - pushing the equipment
  - setting up the patient room

Injury-Producing Postures
Forceful or Awkward Movements

- Duration of pressure
  - Under 10 minutes 30% limited study
  - 10-15 minutes -31.4% TV only
  - 15-30 minutes -29.1% OB
  - Over 30 minutes -9.5% fetal exams

What is the maximum time you maintain one body position while scanning?
Poor Posture
Improper Positioning

- Twisting of neck/trunk
  - poor postural alignment
  - scanning behind the midline
  - unsupported arm

Factors Contributing to MSDs in Sonography

- Physical factors
  - age
  - gender
  - height and weight
  - hand dominance
  - systemic illnesses
  - physical fitness
  - years in profession

Summary of Factors Contributing to MSDs

- Workplace
  - number of scans per month
  - scan time
  - Transducer/ system design
  - chair/stool position
  - exam table position
  - pushing system

Staging of MSD Symptoms

- Stage 1: aching, fatigue that subside with overnight rest, work performance not affected
- Stage 2: aching, fatigue that do not subside with overnight rest, symptoms occur earlier in the day; may affect job performance
- Stage 3: aching, fatigue, weakness result in reduced performance in work and leisure activities; symptoms disturb sleep and may last for months or years

Conditions

- carpal tunnel
- tennis elbow (lateral epicondylitis)
- golfer’s elbow (medial epicondylitis)
- DeQuervain’s
- tenosynovitis
- trigger finger
- bursitis (shoulder)
- nonspecific pain or symptoms in back and neck that don’t follow a pattern
- thoracic outlet

Results of Survey

- Static positioning:
  - All students have prolonged static positioning as they try to perfect their images.
- What activities aggravate the pain?
  - applying pressure
  - shoulder abduction
  - twisting neck and trunk
  - bedside studies
  - gripping the transducer
Summary of Survey

- The incidence of scanning in pain has increased from 81% to 90% according to the data collected in 2008 by Sound Ergonomics using an ARDMS and SDMS database.
- Areas most affected
  - shoulder
  - neck

Global Perspective

Hospitals and clinics
- USA = 90%
- Canada = 87%
- Italy = 80%
- UK = 89%
- Australia = 95%
- New Zealand = 93%

Risk Factor: Abduction

Abduction of the scanning arm

Perinatologist performing a scan using incorrect posture

Solution
- Lower the table
- Elevate your chair
- Reduce angle of abduction to 30 degrees or less
- Stand up
- Patient touching your hip

Risk Factor: Abduction

60 minutes at 30 degrees
20 minutes at 60 degrees
10 minutes at 90 degrees

Endovaginal Scanning

Notice the angle of the wrist and shoulder.

A better way to do an endovaginal scan is with the scanning arm supported and the patient using stirrups.

Relax your shoulder

Notice the angle of the wrist and shoulder.
Risk Factor: Reaching

- Endurance Time

- 30 minutes for 30-cm reach
- 20 minutes for 40-cm reach
- 7 minutes for 50-cm reach

Baker, Coffin

Risk Factor: Reaching

- Correctly position the equipment with respect to the table and patient.
- Need enough leg room to bring the console close.
- Need controls to be to the left of mid console for right handed scanning and vice versa.
- Don’t keep the arm extended over the knobs or freeze button.

Baker, Coffin

Risk Factor: Neck Twisting

- Solution
  - Position the monitor in such a way as to reduce the turn on your head.
  - Do not share the monitor with the patient.

Baker, Coffin

Risk Factor: Twisting & Bending of the Neck

- Keep your neck in the neutral position
  - Any neck extension is a risk for injury
  - Caused by exam chair being too low and monitor height too high
- Neck flexion should be no more than 20 degrees.

Baker, Coffin

Risk Factor: Twisting of the Trunk

- Solution
  - weight evenly on both feet when standing
  - sit up straight with good postural alignment
  - Use abdominal muscles to support trunk

Baker, Coffin
Obesity

- Patients: main reason for worker’s need to use excessive force & strain
- Workers: obesity reduces physical capacity to do work

Work in an Optimal Zone

Good Postural Alignment

Correct Position When Standing

Power Grip Versus Pinch Grip

- Hold the transducer with a power grip whenever possible.
- Try to avoid a pinch grip.

Risk Factor: Grip

- Gripping transducer too tightly
- Solution
  - Use textured fingers gloves.
  - Use gloves that fit and are not too big.
  - Lighten your grip.

Gloves
**Risk Factor: Grip**

Baker, Coffin

---

**Risk Factor: Wrist Deviation**

Should not radial deviate more than 15 degrees
Should not ulnar deviate more than 25 degrees

Baker, Coffin

---

**Risk Factor: Wrist Deviation**

Baker, Coffin

---

**Risk Factor: Wrist Flexion/Extension**

Tendency to both hyperflex and extend wrist when doing OB ultrasound exams

Baker, Coffin

---

**Anatomy of the Wrist**

Baker, Coffin

---

**Risk Factor: Wrist Torque**

- Solution
  - Systems should have flexible light weight cables.
  - Use a cable brace to support the cable.

Baker, Coffin
**Risk Factor: Summary Wrist**

- Uncomfortable arm positions
  - Hyperextension or flexion of hand and wrist.
  - Note the white knuckles, an indication of a tight grip.

**Risk Factors: Foot Position**

- **Solution**
  - Place feet firmly on the ground or on the system.
  - Support your body from your abdominal muscles.

**Incorrect Position**

- Monitor too low
- Trunk twisted
- Shoulder abduction 90°
- Long reach with right arm

**Correct Position**

- Monitor right height
- Shoulder abduction less than 30°
### Setting Up Your Workstation

- Adjust so keyboard is at or just below elbow level.
  - May need to adjust chair.
- Utilize presets to minimize keystrokes.
- Avoid resting your hand on control panel when not annotating.

### Keyboard and Monitor

- Height adjustable
- Capable of rotating
- Frequently used keys easily accessible
  - Minimize abduction
- Monitor independent of keyboard
- Space underneath for sonographer’s knees
  - Reduce reaching
- No sharing with patient!

### Ultrasound Equipment Control Panel

- Postural alignment
  - No more than 30 degrees arm abduction
  - Use abdominal muscles for support
  - Maintain normal spinal curvature
  - Even distribution of weight
  - Head level or slightly flexed
  - Knees lower than hips when seated

### Workstations With Ergonomic Features

- Photo courtesy of Philips Medical Systems
- Photo courtesy of GE Baker, Coffin

### Employee Responsibility

- Postural alignment
  - No more than 30 degrees arm abduction
  - Use abdominal muscles for support
  - Maintain normal spinal curvature
  - Even distribution of weight
  - Head level or slightly flexed
  - Knees lower than hips when seated

- Courtesy of Toshiba web site Aplio

- Courtesy of GE

- Courtesy of GE Baker, Coffin

- Courtesy of GE Baker, Coffin

- Courtesy of GE Baker, Coffin
Conclusions

• Ultrasound is important.
• It is more important than surgery.
• At least 50% of a resident’s time should be spent in ultrasound.
• This being the case, the length of your career depends on you avoiding injury from scanning.

Summary

• Injury rates are high in sonography
  – Know the risk factors and minimize or avoid them as much possible.
• Risk factors are
  – eye strain
  – twisting of trunk and neck
  – reaching
  – abduction of scanning arm
  – grip and wrist deviation
  – hyperextension and flexion of the wrist

Key References


Thank You!