

JOINT PAIN IN THE ADOLESCENT

HOW SERIOUS CAN THAT BE?

ROBERT A. KELLY, M.D.

RESURGENS ORTHOPAEDICS



RESURGENS^{PC}
ORTHOPAEDICS

JOINT PAIN IN THE ADOLESCENT

- INJURIES ABOUT JOINTS CAN BE CLASSIFIED AS EITHER:
- ACUTE/TRAUMATIC
OR
- REPETITIVE/OVERUSE

JOINT PAIN IN ADOLESCENTS

- THE MORE SERIOUS INJURIES ARE USUALLY ACUTE/TRAUMATIC EVENTS:
 - COLLISIONS
 - FALLS
 - SUDDEN CHANGE IN DIRECTION

JOINT PAIN IN ADOLESCENTS

- REPETITIVE ACTIVITIES SUCH AS RUNNING AND THROWING MAY RESULT IN OVERUSE INJURIES.
- THESE ARE **USUALLY NOT SERIOUS INJURIES.....BUT NOT ALWAYS.**

JOINT PAIN IN ADOLESCENTS

- ADOLESCENT JOINTS ARE DIFFERENT FROM ADULT JOINTS.
- ADOLESCENTS HAVE A LAYER OF CARTILAGE BETWEEN THE BONES THAT MAKE UP THE JOINT.
- THIS CARTILAGE LAYER IS THE GROWTH PLATE.

JOINT PAIN IN ADOLESCENTS

- THESE GROWTH PLATES(GP) PROVIDE LONGITUDINAL GROWTH AS WELL AS GIRTH TO THE LIMB.
- GROWTH PLATES ARE NOT AS STRONG AS THE SURROUNDING BONE.
- GROWTH PLATES PROVIDE A WEAK LINK IN THE BONE-GP-TENDON/LIGAMENT COMPLEX.

JOINT PAIN IN ADOLESCENTS

- BASEBALL INJURIES LIKE ANY SPORT CAN AFFECT ANY JOINT BUT THE MAJORITY REVOLVE AROUND THE SHOULDER, ELBOW, KNEE AND ANKLE.

JOINT PAIN IN ADOLESCENTS

- THERE ARE VERY FEW OVERUSE INJURIES TO THE FOOT AND ANKLE;
 - SEVER'S DISEASE
 - STRESS FRACTURES

SEVER'S DISEASE

- THE ACHILLES TENDON ATTACHES TO THE BACK OF THE HEEL BONE.
- NEAR THE INSERTION SITE OF THE ACHILLES TENDON IS A GROWTH PLATE.
- THE CALF MUSCLE/ACHILLES TENDON COMPLEX IS USED FOR PUSH-OFF DURING RUNNING.

SEVER'S DISEASE

- AS A RESULT THERE ARE TREMENDOUS FORCES ACTING ACROSS THIS GROWTH PLATE.
- OCCASSIONALLY THESE FORCES CAUSE AN IRRITATION OF THE GROWTH PLATE(SEVERS DISEASE), RESULTING IN PAIN AND AN INABILITY TO RUN FAST.
- REST AND ICE IS CURATIVE.

JOINT PAIN IN ADOLESCENTS

- THERE ARE SEVERAL OVERUSE ENTITIES FOUND ABOUT THE KNEE:
 - SINDING-LARSEN-JOHANSSON DISEASE
 - OSGOOD-SCHLATTER DISEASE
 - PATELLOFEMORAL SYNDROME

PATELLOFEMORAL SYNDROME

- SINGLE MOST COMMON KNEE COMPLAINT SEEN IN THE OFFICE.
- PAIN IN FRONT OF THE KNEE
- PAIN CAUSED BY SQUATING, BENDING ACTIVITIES (SQUATS, RUNNING STAIRS)

PATELLOFEMORAL SYNDROME

- THE PAIN OCCURS FROM POOR TRACKING OF THE KNEE CAP IN THE FRONT OF THE KNEE.
- NO HARM DONE TO THE KNEE BY PLAYING ON IT.
- TREATMENT: ICE, QUAD EXERCISES AND NSAIDS.

OSGOOD-SCHLATTER DISEASE

- PAIN LOCALIZED TO THE FRONT OF THE KNEE.
- COMMON IN BOYS AND GIRLS 10-14.
- PAIN WITH RUNNING.
- PAINFUL BUMP OVER THE TOP OF THE LEG.

OSGOOD-SCHLATTER DISEASE

- TRACTION FORCES FROM THE THIGH MUSCLE PULL THROUGH A GROWTH PLATE IN THE LEG, RESULTING IN INFLAMMATION OF THE GROWTH PLATE AND PAIN.
- TREATMENT: REST, ICE , ACTIVIITY MODIFICATION.

SINDING-LARSEN-JOHANSSON DISEASE

- KNEE PAIN IN THE FRONT OF THE KNEE.
- PAIN LOCALIZED TO THE BOTTOM TIP OF THE KNEE CAP
- BOYS 10-12
- PAIN OCCURS WITH JUMPING/RUNNING

SINDING-LARSEN-JOHANSSON DISEASE

- THE PAIN IS A RESULT OF PERSISTENT TRACTION THROUGH THE BOTTOM OF THE DEVELOPING KNEE CAP.
- REST, ICE, ACTIVITY MODIFICATION ARE MAINSTAY OF TREATMENT.

JOINT PAIN IN ADOLESCENTS

- ALL OF THE ABOVE LOWER EXTREMITY OVERUSE ENTITIES ARE NOT CONSIDERED SERIOUS INJURIES.
- ALL ARE EFFECTIVELY TREATED THE SAME: REST, ICE, A MODIFIED EXERCISE ROUTINE AND RETURN TO PLAY WHEN THE ATHLETE IS COMFORTABLE.

JOINT PAIN IN ADOLESCENTS

- SO WHAT IS A SERIOUS INJURY?
- HOW DO YOU KNOW WHAT NEEDS FURTHER/URGENT ATTENTION?

JOINT PAIN IN ADOLESCENTS

- OBVIOUS SWELLING IN THE JOINT NEEDS ATTENTION, BUT NOT URGENTLY.
- PAIN SEVERE ENOUGH TO KEEP THE ATHLETE FROM WEIGHT BEARING - NEEDS ATTENTION WITHIN A DAY.
- ANY DEFORMITY NEEDS IMMEDIATE ATTENTION.

JOINT PAIN IN ADOLESCENTS

- FIRST AID:
 - IMMOBILIZE THE EXTREMITY WITH WHATEVER YOU HAVE, ROLLED UP NEWSPAPERS AND STRIPS OF A SHEET MAY DO THE TRICK.
 - APPLY ICE IF AVAILABLE
 - ELEVATE THE EXTREMITY IF POSSIBLE.

JOINT PAIN IN ADOLESCENTS

- SHOULDER AND ELBOW OVERUSE INJURIES ARE QUITE COMMON, NOT ONLY WITH BASEBALL BUT WITH TENNIS AND HANDBALL PLAYERS.
- THE PREDOMINANT POSITION WITH THE MOST SHOULDER AND ELBOW COMPLAINTS IS THE PITCHER.

JOINT PAIN IN ADOLESCENTS

- THE MECHANICS OF THROWING GENERATE TREMENDOUS FORCES ABOUT THE SHOULDER AND ELBOW, PREDISPOSING THOSE AREAS TO A NUMBER OF OVERUSE INJURIES.

BIOMECHANICS OF THE BASEBALL THROW

- AT BALL RELEASE, THE SHOULDER IS AT AN ANGLE OF 237 DEGREES WITH A SHOULDER ANGULAR VELOCITY OF 420 DEGREES/SEC.
- MAXIMUM SHOULDER VELOCITY IS 2580 DEGREES/SEC.

BIOMECHANICS OF THE BASEBALL THROW

- THE ELBOW ANGLE AT BALL RELEASE WAS 126 DEGREES. THE ELBOW VELOCITY WAS 2160 DEGREES/SEC.
- MAXIMUM ELBOW ANGULAR VELOCITY WAS 2220 DEGREES/SEC.

JOINT PAIN IN ADOLESCENTS

- OVERUSE SHOULDER INJURIES:
 - LITTLE LEAGUE SHOULDER
 - ROTATOR CUFF TENDONITIS
 - SHOULDER SUBLUXATION

LITTLE LEAGUE SHOULDER

- EPIPHYSEOLYSIS OF THE PROXIMAL HUMERUS.
- LARGE GROWTH PLATE BETWEEN THE BALL AND THE SHAFT OF THE ARM BONE.
- INFLAMMATION OF THE GROWTH PLATE DUE TO TRACTION/TORSIONAL FORCES SECONDARY TO THROWING.

LITTLE LEAGUE SHOULDER

- OCCURS IN MALES : 12-15
- ASSOCIATED WITH:
 - INTENSITY OF PITCHING
 - AGE PITCHING WAS STARTED
 - THROWING CURVE BALLS
- TREATMENT: REST, ICE , GRADUAL RETURN TO PLAY IN 1-2 MONTHS

ROTATOR CUFF TENDONITIS

- USUALLY RESERVED FOR OLDER ATHLETES BUT INCREASINGLY FOUND IN ADOLESCENT THROWERS

SHOULDER ANATOMY

- THE SHOULDER JOINT IS LIKE A GOLF BALL ON A TEE. THE SOCKET IS SHALLOW WHILE THE BALL IS CONSIDERABLY LARGER (SURFACE AREA IS 4 TIMES THE SOCKETS).
- LIGAMENTS STABILIZE THE BALL. THEY ARE LIKE SHORT ROPES CONNECTING ONE SIDE OF THE JOINT TO THE OTHER.

SHOULDER ANATOMY

- THE ROTATOR CUFF (RC) IS A GROUP OF FOUR MUSCLES.
- THEY ARISE FROM THE SHOULDER BLADE AND CONVERGE ABOUT THE JOINT.
- THE PURPOSE OF THE RC IS TO KEEP THE BALL CENTERED IN THE SOCKET, ALLOWING THE BIGGER MUSCLE GROUPS TO WORK EFFICIENTLY.

SHOULDER ANATOMY

- THE LIGAMENTS AND A PORTION OF THE ROTATOR CUFF (EXTERNAL ROTATORS) ACT IN CONCERT TO KEEP THE BALL IN THE SOCKET.
- AT BALL RELEASE, THE DISTRACTION FORCE ON THE JOINT IS AROUND 90% OF AN INDIVIDUAL'S BODY WEIGHT.

ROTATOR CUFF TENDONITIS

- REPETITIVE THROWING CAN PUT EXCESSIVE DEMANDS ON THE ROTATOR CUFF, LEADING TO TENDON INJURY, INFLAMMATION AND PAIN.
- INITIALLY THE PAIN IS MILD AND MAY DISAPPEAR AFTER THE FIRST SEVERAL THROWS, ONLY TO RETURN AFTER THROWING HAS ENDED.

ROTATOR CUFF TENDONITIS

- IN THE MORE ADVANCED STAGES OF TENDONITIS, THE PAIN INTENSIFIES AS THE THROWING SESSION PROGRESSES. THERE MAY BE NIGHT PAIN.
- TREATMENT: ICE, REST, RC EXERCISES, NSAID'S
- RETURN TO THROWING WHEN PAIN FREE AND RC STRENGTH IS NORMAL.

SHOULDER SUBLUXATION

- THERE IS A CERTAIN AMOUNT OF “PLAY” IN THE SHOULDER JOINT. IT VARIES BETWEEN INDIVIDUALS AND EVEN BETWEEN THE TWO SHOULDERS OF THE SAME INDIVIDUAL.
- THROWERS HAVE MORE “PLAY” IN THEIR SHOULDER THAN MOST.

SHOULDER SUBLUXATION

- A DISLOCATED SHOULDER IS WHERE THE BALL COMES COMPLETELY OUT OF THE SOCKET AND THERE IS NO CONTACT BETWEEN THE TWO.
- A SUBLUXED SHOULDER IS ABNORMAL “PLAY” WITHIN THE SHOULDER, WHERE THE BALL ALMOST COMES OUT OF THE SOCKET BUT NOT QUITE.

SHOULDER SUBLUXATION

- THE LIGAMENTS ARE EITHER STRETCHED OUT OR TORN DUE TO THE REPETITIVE FORCES OF THROWING.
- THERE IS PAIN AT LATE COCKING OR EARLY ACCELERATION.
- SOME MAY EXPERIENCE A “DEAD ARM SYNDROME” WHERE THE ARM GOES LIMP FOR 20-30 SECONDS.

SHOULDER SUBLUXATION

- THIS REQUIRES FURTHER INVESTIGATION, PERHAPS AN MRI.
- OFTEN REST AND EXERCISES WILL TAKE CARE OF THE PROBLEM.
- IF THE LIGAMENTS ARE TORN, HOWEVER, SUGERY IS OFTEN NECESSARY .

JOINT PAIN IN ADOLESCENTS

- ELBOW OVERUSE INJURIES:
 - LITTLE LEAGUE ELBOW
 - UCL TEARS

ELBOW ANATOMY

- THE ELBOW JOINT IS QUITE COMPLEX AND IS REALLY MADE UP OF THREE JOINTS.
- IN THE ADOLESCENT THERE ARE MANY GROWTH PLATES IN THE ELBOW, THE MAJOR ONE ON THE INSIDE.

ELBOW ANATOMY

- THE MAJOR STABILIZING LIGAMENTS OF THE ELBOW ARE ON THE INSIDE OF THE ELBOW (TOMMY JOHN LIGAMENT).
- THE MAJOR MUSCLES OF THE FOREARM THAT PARTICIPATE IN THROWING ATTACH TO THE INSIDE OF THE ELBOW.
- THE GROWTH PLATE, MUSCLES AND LIGAMENTS CONVEGE TO A COMMON ORIGIN

ELBOW BIOMECHANICS

- DURING THROWING, THE FOREARM BENDS OUTWARD IN RELATIONSHIP TO THE ARM.
- THIS PLACES DISTRACTION FORCES ON THE INSIDE OF THE ELBOW AND COMPRESSIVE FORCES ON THE OUTSIDE OF THE ELBOW JOINT.

LITTLE LEAGUE ELBOW

- COMPRISED OF SEVERAL ENTITIES.
- REPETITIVE TRACTION FORCES FROM THE MUSCLES AND LIGAMENTS DURING THROWING ARE DIRECTED THROUGH THE GROWTH PLATE.
- LEADS TO INFLAMMATION, PAIN AND EVEN FAILURE OF THE GROWTH PLATE ON THE INSIDE OF THE ELBOW.

LITTLE LEAGUE ELBOW

- COMPRESSIVE FORCES ARE DIRECTED TO THE OUTSIDE OF THE ELBOW.
- BRUISING/FRAGMENTATION OF THE JOINT CAN OCCUR WITH REPETITIVE THROWING.

LITTLE LEAGUE ELBOW

- PAIN WITH THROWING, GRADUALLY WORSENS WITH EVERY THROW.
- PAINFUL TO TOUCH THE KNOBBY PORTION OF THE INSIDE OF THE ELBOW.
- USUALLY UNABLE TO STRAIGHTEN OUT THE ELBOW.

LITTLE LEAGUE ELBOW

- IF THE OUTSIDE OF THE ELBOW JOINT IS PAINFUL, YOU HAVE TO WORRY ABOUT FRAGMENTATION OF THE JOINT (OSTEOCHONDritis DESSICANS).
- MOST COMMON IN BOYS 13-16.
- SURGERY MAY BE NECESSARY IF LOOSE FRAGMENTS START LOCKING UP THE JOINT.

TOMMY JOHN INJURY

- THE INSIDE ELBOW LIGAMENT IS THE MAIN STABILIZER OF THE ELBOW, ESPECIALLY DURING THROWING.
- IT CAN BE TORN FROM REPETITIVE THROWING OR FROM ONE TRAUMATIC THROW.
- MOST COMPETITIVE THROWERS NEED THAT LIGAMENT REBUILT IF IT IS TORN (TOMMY JOHN SURGERY).

TOMMY JOHN INJURY

- DEVESTATING INJURY, EQUIVALENT TO AN ACL INJURY OF THE KNEE.
- RECOVERY IS 9-12 MONTHS AFTER SURGERY.
- DESPITE WHAT SOME THROWERS MAY SAY, THE ELBOW IS **NOT** BETTER THAN BEFORE THE INJURY.

JOINT PAIN IN ADOLESCENTS

- SO WHAT ARE SERIOUS SHOULDER AND ELBOW COMPLAINTS?
- PAIN BEFORE, DURING AND AFTER THROWING.
- PAIN THAT INCREASES WITH EVERY THROW.
- DEAD ARM SYNDROME.
- ABRUPT LOSS OF ELBOW MOTION.

JOINT PAIN IN ADOLESCENTS

- ANY TIME A REPETITIVE INJURY PROGRESSES TO THE POINT IT NEEDS SURGERY, IT IS A SERIOUS PROBLEM.
- IT REQUIRES A CONCERTED EFFORT BY ATHLETES, COACHES, TEAM PHYSICIANS AND PARENTS TO CATCH THESE PROBLEMS EARLY IF POSSIBLE.

JOINT PAIN IN ADOLESCENTS

- PREVENTIVE MEASURES:
 - STRETCHING/ CARDIOVASCULAR CONDITIONING
 - REGULAR STRENGTH TRAINING INCLUDING THE ROTATOR CUFF MUSCLE GROUP.
 - TEACHING PROPER THROWING MECHANICS.
 - MAINTAINING A PITCH COUNT.
 - WAITING UNTIL NEAR SKELETAL MATURITY BEFORE THROWING A CURVE BALL.

THANK YOU.

QUESTIONS/COMMENTS?



RESURGENS^{PC}
ORTHOPAEDICS