Sven-Anders Sölveborn

Emergency Orthopedics

A Manual on Acute Conditions of the Locomotor System



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Sven-Anders Sölveborn Hospital of Ystad Ystad Sweden

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Preface

Emergency Orthopaedics is a practical and comprehensive manual, describing how to diagnose and treat acute orthopaedic problems. The reader is offered assistance in identifying the injury/disorder and the author gives firm and up-to-date advice on the short term and long term aspects of treatment.

For every condition, the author has extracted such facts that could have practical importance for the management of the disorder. The book has a problem-based approach since the chapter headings consist of the main symptom that the patient presents.

The illustrations are extraordinarily instructive and include guidance on issues usually raised in the E.D., and that are often not included in other literature, such as practical manual measures like reductions (of fractures and joint dislocations) and examination techniques.

Sven-Anders Sölveborn is a senior orthopaedic officer with a very long experience of clinical work, research and education. The book is written with the wisdom that follows extensive practical experience of work in emergency rooms. The author is also an internationally recognized authority in sports medicine and the book offers extremely useful elements of sports medicine principles.

The book is a real treasure-trove, especially for internship doctors, specialty registrars (resident physicians), general practitioners, nurses and other staff in the emergency room. Physiotherapists, chiropractors, and naprapaths will also find the book useful. I warmly recommend it.

Linköping, Sweden

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About the Author

Specialist in orthopaedic surgery and certified sports medicine physician, senior officer and former head of the orthopaedic department, now director of internship education for the Hospital of Ystad, Sweden, former researcher at the Uppsala University, past-president of the Swedish Society of Sports Medicine, now Secretary-General of the North European Chapter of Sports & Exercise Medicine, physician to the Swedish national association of handball, well-known lecturer, author of the best-seller *The Book about Stretching* (translated into 18 foreign languages) and another Swedish original book about "Myths within sports, injuries and the locomotor system".

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Part I

Overview

Introduction

The purpose of this book is to serve as a practical manual for doctors in the emergency room treating patients with injuries and disorders of the musculoskeletal system and as an orientation for nurses and other staff on modern management of these problems in an emergency or general practitioners' clinic.

The disposition is such that the chapter headings logically consist of the main complaint, for which the patient seeks emergency care (the symptoms). Under these headings the different diagnoses that could be appropriate in this connection are outlined, with the most important, and most common conditions marked with an *. The patients will – for obvious reasons – not come to the emergency clinic with a sign on their chest pointing out what diagnosis they are suffering from, for example, "meniscal rupture" and "hip dislocation".

Every actual disorder is then presented from only two aspects: (a) how to make the *diagnosis* and (b) what *treatment* should be given or is recommended in the emergency room. The illustrations are orientated towards practical management and realistic questions in the acute situation regarding treatment measures and examination findings of a kind which has to a great extent often been missing in the ordinary literature so far.

Classification

To increase clarity, the reasons the patients came to the clinic can often be divided into three main categories: trauma, overload and overuse.

- 1. Trauma involves a direct and indirect impact cause of the injury.
- 2. *Overload* means that the strength of the actual tissue has been exceeded on one or a few occasions, e.g. rupture of the Achilles tendon.
- 3. *Overuse* is when an action has been performed by normal or low weight bearing but with many repetitions, and often in a monotonous pattern, e.g. in the case of a stress fracture.

It is wise to make this distinction between overload and overuse since the treatment options for the subsequent disorders are often widely different.

Fundamental Values

Basic behaviour and management in an emergency unit consists of the following fundamental principles:

- 1. *"The customer is always right" –* always behave politely and respectfully, listen carefully to the patient's thoughts and wishes.
- 2. Always take a thorough *patient history* much of the solution to the problem is there, e.g. it has been shown that with the proper anamnestic information, 80 % of the diagnoses for knee and shoulder disorders can be made rather safely (even on the telephone!). Ask "When? Where? and How?" the complaint appeared and if the patient has had the same problem or a similar one previously.
- 3. *Examine the patient carefully* manually Practice examination techniques continually. The patient history and examination status interpreted with good portions of knowledge and common sense are often better than sophisticated and expensive investigation techniques, e.g. magnet camera imaging (MRT), which are without doubt used more often than is absolutely necessary.
- 4. Try do develop the patient consultation in a way that the patient becomes *wiser* (and perhaps more knowledgeable than before about her/his situation) when she/he leaves the examination room. Always give *home instructions*, e.g. regarding physical activity, weight bearing and training instructions, so that the patient can take an active part in self-treatment to stimulate the healing process.
- Consult the back-up on-duty doctor, colleague/specialist, instead of remaining doubtful about something – "there are no stupid questions, only stupid answers".
- 6. *Kindness and politeness* are often the keys to a good consultation; a smile could often be right, even in a difficult situation.
- 7. In the medical sphere and especially in a stressful environment like an emergency unit, it is important to remember that the doctor can sometimes *cure*, in most cases *relieve*, and always *comfort*!
- 8. X-ray examinations are only shadows of reality a normal X-ray taken in casualty can give a false sense of security; analyse the X-ray findings carefully together with the clinical picture and consider taking an X-ray somewhat later, in the elective phase, or consider alternative examinations such as MRT, CT, scintimetry, etc. If the patient insists on having an X-ray taken, there is often no reason to refuse; sometimes, the X-ray can then also be performed after at a later point in time (see item 1 above about the customer).

Major Orthopaedic Trauma

In the primary assessment, an analysis of the trauma and a quick evaluation of the patient condition are included, advisably by the ATLS concept (Advanced Trauma Life Support) through the combination A-B-C-D-E. To secure vital life supporting functions, the A-B-C is the main priority, i.e. Airway (always secure a free airway first, this is the most urgent, and cervical spine control), Breathing (control of spontaneous breathing ability) and Circulation (control of pulse, heart activity and signs of circulatory shock with deteriorated cardiovascular function and consequent oxygen deficit). D and E represent a primary survey regarding Disability (reaction on speech/stimulation/pain) and Exposure (whole body examination) as well as Environment, respectively, in the following chronological order: Chest, Abdomen, Pelvis, Head (including neurology) and Skeleton. The vital functions are thus secured (with attention paid to the cervical spine) and neurological screening completed; after that the chest has the highest priority, followed by the head. People exposed to a major trauma have, on average, two to three body parts/organ systems injured.

Injuries of the Pelvis

Diagnosis. Palpation and compression with respect to tenderness, hematoma (per rectum!), dislocations, sliding, also in vertical direction (since the most dangerous fractures have vertical instability/laxity) and from behind against the sacroiliaca joint. The fracture is stable if the pelvis ring is broken entirely or partly in only one place, but unstable if broken at least at two sites that leads to a sliding displacement/ translation between the two pelvis halves. Nerve injuries are not uncommon with unstable pelvis fractures.

Treatment. For unstable pelvis fracture, shock treatment is started; arrange as stable a fixation as possible with, e.g. girdle, coil banding or a vacuum mattress, and observe for possible injury to the large vessels (general circulatory

compromise, large hematomas that can be of 2–3 litres size). Decision about urgent surgery with external fixation of the pelvis with anterior frame. Radiological mapping regarding skeleton and possible bleeding source (angiography). Also angiographic treatment with coiling could be indicated in selected cases.

Spine Injuries

Diagnosis. Most often indirect trauma with distorsion and possibly rotation with compression of vertebral bodies that, with heavier violence, can disrupt and be pushed into the spinal canal. Fractures of vertebral arches incur a risk of instability and distraction injury to the spine marrow. Complete or incomplete transsectional lesions occur in spinal cord injuries, i.e. nerve function loss below the level of injury, above C4 paralysis of the breathing, at the C4-Th1 level tetraplegia and below this level paraplegia.

Injuries where the spinal cord is involved are, luckily enough, a relatively small portion of the spinal injuries.

The cervical spine and the thoracolumbar transitional zone are more often affected by injuries than the other parts. Observe the risk of cervical spine injuries after severe trauma to the head – often there are injuries to both head and neck! Injuries in the cervical spine and upper thorax can lead to loss of breathing function. Injuries to the cervical spine are common for severely injured patients; take caution when lifting, moving and examining. Avoid forward bending of the cervical spine! Observe and palpate the spine for dislocations, malformations, hematomas and tenderness at the spinous processes. Careful motion can provoke pain and crepitations. Check the ability to move the arms and the legs and the sensibility.

Treatment. Stabilise with stiff cervical collar and support, before and after the use of this, with, e.g. a towel roll in the cervical lordosis and cushions on both sides, alternatively use vacuum mattress. ATLS recommends manual stabilisation when removing the neck collar in case of intubation and clinical examination. Secure free airway, especially for patients with depressed consciousness. With signs of neurological deficits, high-dose corticosteroids can be given, but according to a different school of thought, steroids should not be administered. For unstable or dislocated injuries in the cervical spine, halo traction should be used (this can be done in local anaesthesia) with 12 kg of traction initially.

Shock treatment in circulatory compromise with primarily fluids and secondarily inotrops and vasopressors. Translation of a vertebra >3 mm and wedge angulation $>11^{\circ}$ indicates an unstable fracture, just as a combined anterior and posterior column injury does. Facet joint (sub)dislocation also suggests instability, even if the fracture cannot be visualised (ligamentous injury). Undisplaced stable fractures can be treated with a soft collar for 2–4 weeks, and if there is any doubt about the stability, the patient should be called back after 10 days for

Extremity Injuries

Diagnosis. Systematic inspection of the extremities regarding presence of major bleeding, wounds or soft tissue injury and visible dislocation. Palpation on joints and diaphyses, cautious examination of movement to reveal pain reaction, tenderness, swelling and crepitations. Evaluate distal status with registration of vascular and nerve function distally from the injury (circulation, sensibility and motility). Observe signs of acute compartment syndrome like progressing pain, more firm muscle tissue in consistency (can become stiff like a board), weakness or inability to use the affected muscles and pain on passive stretch.

Treatment. Irrigate contaminated injuries with isotone saline fluid, stop bleeding with compression bandage. Cover injuries with sterile cloths. When needed, make preliminary gross morphological reduction to eliminate major fracture dislocations and joint dislocations, which, close to the time of injury (within 10-30 min), can be done even without anaesthesia or muscle relaxants. Always reduce by simultaneous traction in longitudinal axial direction, preferably together with a co-worker, who maintains resistance on the other side of the injury. Use slow and careful movements. First, neutralise gross angular dislocation and then gross rotational malposition. Keep the traction until the fixation/immobilisation is established. Give antibiotics early in case of open injuries with contamination or devitalized tissue. After traumatic amputation, there is as a rule astonishingly small or no bleeding (spasm of the arteries and fall of blood pressure), but risk of new arterial bleeding by shock treatment or movement of the patient. Disrupted and amputated body parts should be transported as sterile as possible, e.g. wrapped by compress in a sterile glove and/or in isotone saline solution in cold pack/ice bag. High priority for surgery when fractures with vascular or nerve injuries in spite of gross reduction, as well as open fractures. If circular plaster of cast is established primarily, it should always be cut up. Cast bandages should principally involve the joints on both sides of the fracture.

Acute Soft Tissue Injuries

(Strains and Contusions, e.g. in Sports)

Measures

- 1. Interrupt the activity, e.g. sports exercise.
- 2. *High compression bandage* is immediately put directly on the skin with a fully outstretched elastic roller (corresponding to a pressure of 80 mmHg), possibly together with a pelot/adjusted disc on or around the injured area, kept on place for 15–20 min.
- 3. *Elevation*, where the heart is the reference level, preferably at least 50–60 cm above.
- 4. Change to *compression bandage* with moderate pressure after 15–20 min, i.e. with a halfway outstretched elastic roller (tip: stretch out the bandage fully, then reduce the traction to half the distance and wrap around, which corresponds to 40 mmHg), keep in place as long as swelling and/or pain still is experienced (usually 1–4 days). In this phase, cold treatment with ice bag or cold pack can be appropriate for pain relief and a certain amount of bleeding reduction through vascular contraction.
- 5. *Balanced/unloaded activity* early; motion without weight bearing can almost always be started immediately.

Taping of fingers and ankles may be performed for reasons of stabilisation, pain relief, stimulation of the proprioception and prevention of new distorsion, but never tape a swollen joint.

Part II

Foot

Foot Injuries

Immediate measures: Elastic bandage (consider skin cleaning), elevation and X-ray

Contusion (including Subungual Hematoma) * S90.3/0

Diagnosis. Nearly always an impact or bump to the toes or from falling object. A hematoma under the big toenail can produce intense pain depending on the pressure.

Treatment. Evacuation with a straightened, tip-glowing paperclip directly through the nail, which often makes the blood squirt up and promptly relieves the pain.

Toe Fracture (including Sesamoid Bone Fracture) * S92.4/5

Diagnosis. Most often direct trauma, with fracture more apparent hematoma discolouring (ecchymosis) than with contusion, but distal phalanx fractures often have simultaneous subungual hematomas. When a fracture of dig. 2–5 is suspected in an ordinary trauma situation, X-ray can in fact be refrained from. A safe sign is axial compression tenderness, with pressure in longitudinal direction.

Treatment. A displaced fracture of the proximal phalanx of the big toe should be reduced through traction and often fixed by pinning transcutaneously (or with open surgery). Undisplaced big toe fracture can be treated by so-called spica taping (overlapping taping along the entire big toe) for 2–3 weeks or just an elastic bandage together with wooden shoes or any other kind of broad and stable footwear.