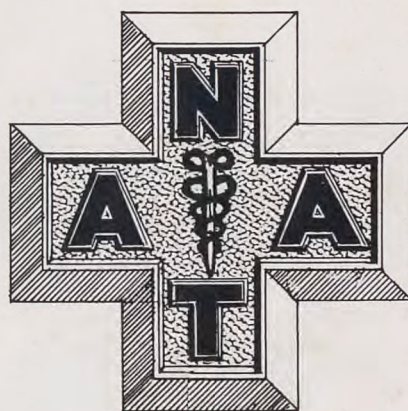


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## CONGENITAL ANOMALIES OF THE LOW BACK

### .... THEIR RELATIONSHIP TO ATHLETIC INJURIES

KENNETH D. ROSE, M.A., M.D.

Chief of Medical Laboratory and Research, The University  
Health Center, The University of Nebraska  
Lincoln, Nebraska

Reprinted from *Medical Times*, October, 1961

It was to be a "down and out" pass pattern during the first high school practice scrimmage of the year. The ball was snapped, the right halfback moved out through a hole between tackle and end and faded into the flat. He turned and picked a perfect pass out of the air but, before he reached the ground, he was hit high by the defensive end, who was dropping back to block the pass. An instant later, the left defensive line backer, who had come up to defend against the play, hit him low with a bruising full-steam tackle. He was carried off the field a few minutes later on a stretcher, writhing with pain in his back. That was in 1958. We saw him first in the fall of 1960 when he came to the University of Nebraska; but not to play football, because his football days were over. What was his story? Certainly one from which we all can profit, and one which forms the basis of this paper, and in fact, all of our theories about pre-participation football-examinations, especially those related to the low back.

G. L. was a husky boy of fifteen, a freshman in high school, when he first went out for football. During his freshman year, he injured his back while playing. X-rays at that time revealed a congenital anomaly of the spine. After having worn a brace for a year and a half, the combined pressures of the boy, his coach and his father (who was superintendent of the school) persuaded the physician in attendance to allow this boy to go out for football again in his junior year in high school. The above recorded story is a true account of his return to football. He never played another game. When seen at our clinic two years later, he was still wearing a brace and was bothered by constant nerve root numbness and pain bilaterally. One stabilization operation had been unsuccessful. We urged him to drop out of school and have it reoperated. This was done, but did not relieve his symptoms entirely. His diagnosis, as best shown by x-ray, was "bilateral pedicle defects, spondylolisthesis and spina bifida occulta."

G. L. was not the only boy with such a story. There was D. R., a seventeen-year-old farm youth, examined in our clinic during his freshman year in University. He was accustomed to doing hard labor and had been bothered by a certain amount of recurrent low back pain for years. This was not incapacitating, until he was severely injured during a football game in his senior year in high school. A spot lateral of his lumbosacral joint revealed a spondylolisthesis, Grade II, the structural cause of which was a bilateral pedicle defect (Figure 1). This latter lesion is best shown in the oblique views (not presented here) but can be suspected by an abnormal channel (see arrow) usually seen in a good lateral view. Note the posterior "dishing" in the sacral segment. This boy is physically disqualified for military service and is the unwilling recipient of a chronic, disabling, low-back problem, precipitated by two general factors: 1. An unawareness, by physician, coach, parents and patient, of the existence of

a bilateral pedicle defect, or the potential hazards inherent in an anomaly of this type. 2. The physical stresses that are applied to the lumbo-sacral articulation during a vigorously fought football game. The net result, in this boy's instance, is a back that will not only give him physical discomfort but which will limit his future occupation potentialities.

Experience with these and other similar cases have led physicians at the University of Nebraska to be selective in their acceptance of candidates for varsity athletics. Because of such selectivity, we have often been the target for criticism, at times severe and lasting, from sports writers, alumni, coaches and parents. Interestingly enough, we receive the least criticism from the patient. As an example, let us consider the case of a healthy, young, seventeen-year-old boy who possessed all the attributes of the player our team most needed, intelligence, speed and just enough weight and height to qualify him for a top-notch backfield position. He was All-State halfback and voted "most valuable player" at the post-season All-Star game. He decided to select his home state University, a feat in itself considering current recruiting practices. At the time of his physical examination he was rejected. The local and regional reaction was, to say the least, not favorable. What is his story?

Although it was denied at the time of his physical examination, this young man had had sufficient back complaints for a year, or two, to create definite limitation of his activity. He felt it was just a stiff back, which improved as he limbered up. Physical examination, however, revealed a lumbo-sacral step defect, and x-rays confirmed spina bifida occulta, unilateral pedicle defect and Grade I spondylolisthesis. Varsity football competition is a rigorous activity, and especially so in our league, the Big-8, where bruising ground contact is the order of the day. Therefore, in spite of his excellence as a football player, we could not allow this boy with symptomatic spondylolisthesis to risk further injury to his back. Neither could the parents, nor the coach, legally, or morally, assume the risk for him.

The Committee on Injury and Sports of the American Medical Association has established a "Bill of Rights for the College Athlete," under which is found "Good medical care . . . including: . . . a thorough pre-season history and physical examination. Many of the sports tragedies which occur each year are due to unrecognized health problems. Medical contraindication to participation in contact sports must be respected." Therefore, it is the responsibility of the physician to put this philosophy into action.

We are now more sure of our position than we were in the past. Our first experience came in 1951 when a boy was accepted for varsity football in spite of the fact he had bilateral pedicle defects (L5) and a L5-S1, Grade II spondylolisthesis. He played all four years but was bothered constantly by severe lumbar spasms with pain radiating down the back of both legs at times. He was an inconstant player and could never be depended upon. He has since gone on to a more sedentary type of occupation but still is bothered by chronically recurring backaches, and has remarked that he wishes he had been refused at his pre-participation examination. Another experience came with M. K., an All-State halfback during his high school days. He was found to be suffering from a disc syndrome, x-rays revealing a L3-4 narrowing of the inter-vertebral space. His initial rejection caused such a storm of protest that it left a permanent scar in certain

Continued on page 3

## CONGENITAL ANOMALIES

(Continued)

public relations. Accepted, he played fair Freshman football, received his disabling back injury while "horseplay wrestling" during the Christmas vacations, "laid out" his sophomore year, and "suited up" his junior year but did not play. He was eventually operated on and underwent stabilization surgery. J. C., an All-State basketball player, was refused because of bilateral pedicle defects without spondylolisthesis. He was accepted by another school but, during his first year of competition, became so disabled by back pain he eventually entered the vocational rehabilitation program. J. T. was rejected for football and basket-

ball because of a pedicle defect L4-5 (Figure 2) with Grade I spondylolisthesis. In addition, he had an anomalous first sacral segment and unilateral sacralization of L5. Accepted for track, he had constant lowback pain and lumbar and hamstring tightness and spasm. After one year of attempted track participation, he dropped all athletic competition.

In the past two years, during which fairly accurate records have been kept, twenty-seven candidates for all sports, amounting to approximately ten percent of the total examined, have been found to have clinically significant lowback anomalies. The most common of these

Continued on page 4



FIGURE 1 "Tunnel defect" of bilateral pedicle defect as seen in spot lateral view of lumbo-sacral junction.



FIGURE 2 Pedicle defect L4 with Grade 1 spondylolisthesis L4-5; arrow points to defect.

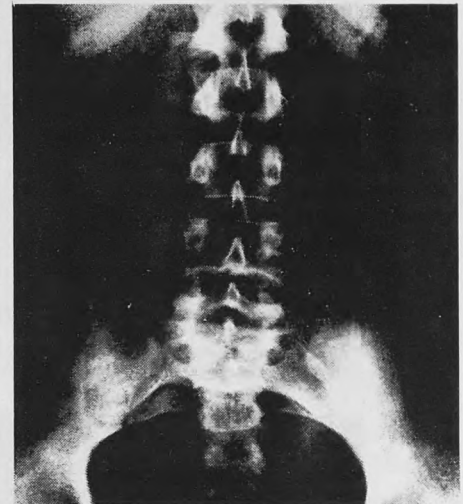


FIGURE 3 A-P lumbar spine. Appears normal.



FIGURE 4 Spot lateral view of lumbo-sacral junction. Spondylolisthesis is obvious.

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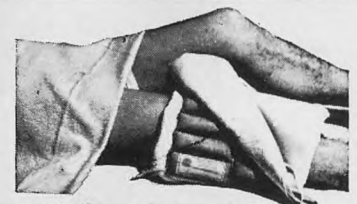
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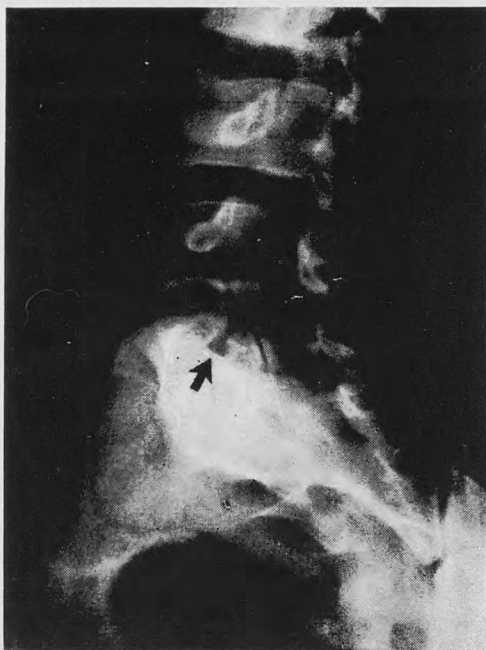
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## CONGENITAL ANOMALIES

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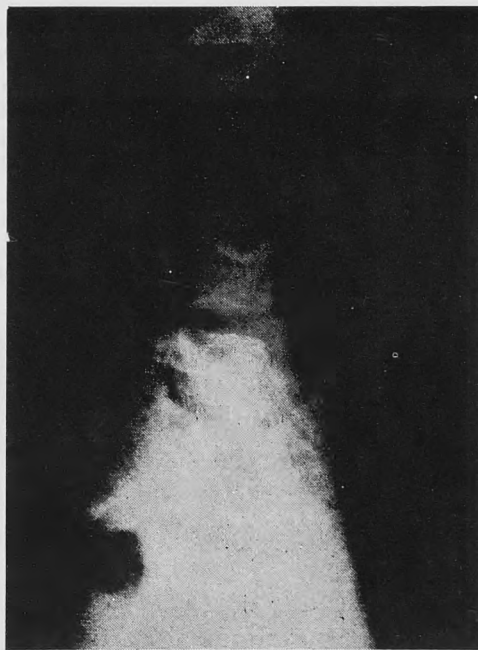


**FIGURE 5** "Collar on scotty dog" defect of congenital non-union of pars interarticularis (pedicle defect). Oblique view.



**FIGURE 6** Pedicle defect as seen in spot lateral view.

have been pedicle defects. Figures 3, 4 and 5 (all of the same patient) clearly demonstrate this most important of anomalies. Figure 3 is presented to show that a single A-P of the lumbar spine can be grossly misleading, since the lateral (Figure 4) shows a pronounced bilateral pedicle defect "tunnel" plus a Grade II spondylolisthesis. The oblique views, one of which is shown in Figure 5, demonstrate a very definite pedicle defect produced by the non-union of this neural arch. Pedicle defects are frequently clearly visible in spot lateral views of the lumbosacral articulation. Figure 6 shows this, and also an attending spondylolisthesis. It is not always L5-S1 that is involved (see Figure 2) but occasionally other vertebra. The pa-



**FIGURE 7** Osteochondrosis. Considered disqualifying for varsity football.



**FIGURES 8** Multiple anomalies of lumbosacral spine.

tient in Figure 7 had a "step defect" at L5-S1 on physical examination, which was found, on x-ray, to be due to a clinically insignificant spina bifida occulta. However, he was also found to be suffering from an osteochondrosis L3-4 which probably represented an old unresolved epiphysitis; although, tuberculosis, brucellosis, or a low grade osteomyelitis, could not be ruled out on films alone. Occasionally, an A-P will reveal multiple anomalies (Figure 8) and a lateral (Figure 9) will confirm one's suspicion that this person ought not be participating in varsity football.

Congenital anomalies of the lumbar spine are usually

Continued on page 6



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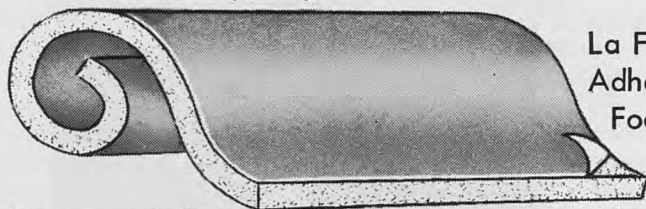
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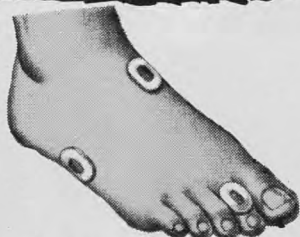


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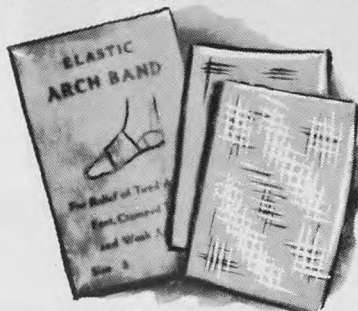
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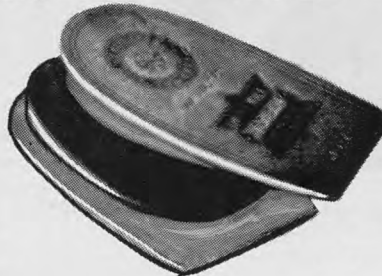
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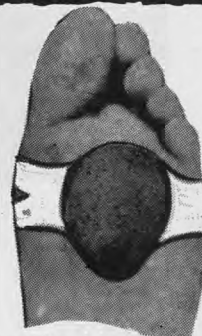
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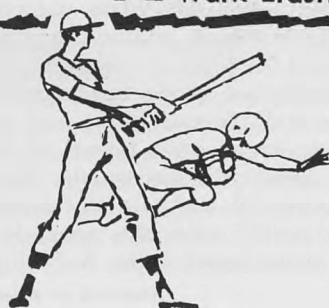
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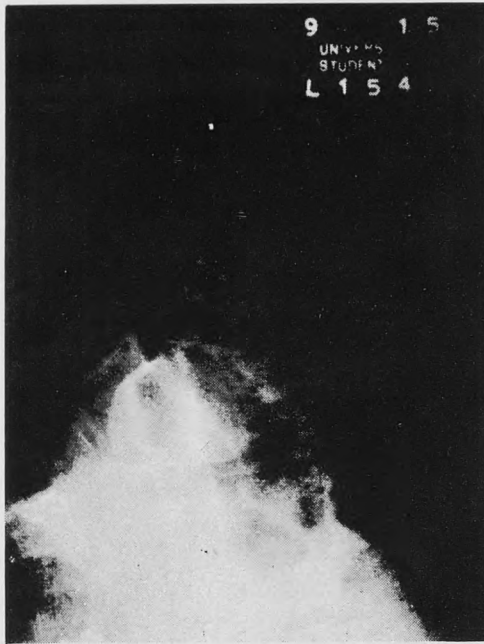


FIGURE 9 Multiple anomalies of lumbosacral spine.



FIGURE 11 Lateral lumbar spine view. (Patient J. B.).

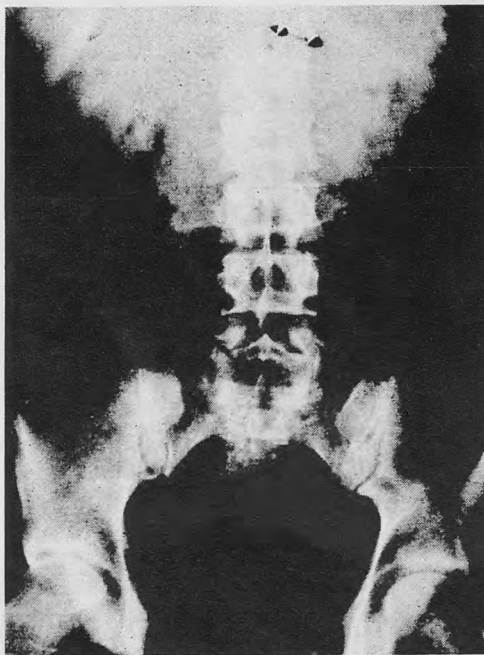


FIGURE 10 Asymmetrical facets L4-5 and suggestion of incomplete bridging of right superior pedicle (L5). Patient J. B.

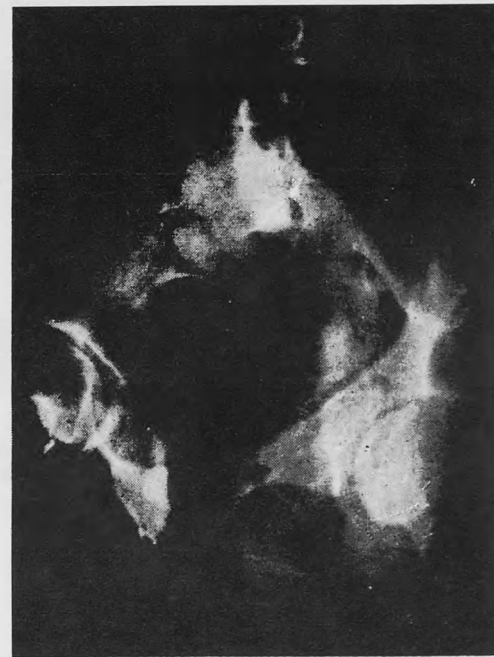


FIGURE 12 Right oblique view of lumbar spine. Patient J. B. Complete defect of the superior pars interarticularis L5.

asymptomatic during childhood. The added weight and additional stresses of adolescence, coupled with the time factor, produce the symptomatology encountered in adolescence. All of our candidates for inter-varsity athletics are questioned closely concerning a history of low-back pain, catches, "lumbago," strains, "stitches," or visits to chiropractor or, osteopathic physician. The physical examination is directed toward evidence of scoliosis, lordosis, flat lumbar curve, lumbar spasms, inability to do a good ninety degree forward bend. An almost certain sign of significant lumbosacral disorder is the "step defect," an easily palpable depression at the lumbo-sacral junction,

and we rely upon it heavily as an indication of the need for further examination. Any candidate showing significant alteration of their low-back anatomy are referred to the x-ray department for films of this area.

Any roentgenological examination of the lumbo-sacral spine that does not include A-P, lateral, right and left obliques of the lumbar spine, and a spot lateral of the lumbo-sacral junction are absolutely incomplete. As a good example, refer to Figures 10 and 11. Any casual, or inexperienced, observer would miss the anomalous articular facet on the right as we noted in the A-P (Fig-

Continued on page 7

**CONGENITAL ANOMALIES**

(Continued)

ure 10). His impression of a "normal lumbo-sacral spine" would be confirmed by the lateral view (Figure 11) which shows no spondylolisthesis. But the right oblique (Figure 12) demonstrates a clear "collar on the scotty dog" complete defect of the superior pars interarticularis on that side. A left oblique (not shown) revealed changes consistent with spondylitis on that side, but no defect. Thus, it is important that a complete x-ray survey be obtained, for it is on the basis of history, physical findings, and x-ray analysis that the examining physician must decide whether or not a candidate has significant lumbo-sacral pathology.

What does, or does not, constitute significant lumbo-sacral pathology is a controversial matter, and one must be entirely objective in arriving at any individual decision. One must first be a physician and last an alumnus. Anything short of that is unfair to the third, and most important party in this triangle, the boy himself.

Any anomalous articulation in the lumbo-sacral area must be held suspect, particularly if it is attended by symptoms or history of backache. We disqualify all pedicle defects, and the reason is obvious. The interarticular facets and processes encircle the segmental nerves. A cartilaginous non-union of this bony protective ring would be subject to displacement under certain shearing forces encountered in football, wrestling, etc., and nerve root injury could result. Another categorically disqualifying disorder is spondylolisthesis, which is positive proof that the normal articular supports have already been compromised. Spina bifida occulta itself is not disqualifying, unless severe or attended by chronic symptoms. Certain diseases, an example of which is shown in Figure 7, should be held suspect, until found to be inactive. In the final analysis, it is the examining physician who must make the ultimate decision, and he must do this on the basis of his knowledge. We hope, by this paper, to stimulate consideration of these problems by physicians responsible for the health and welfare of our high school and college youth.

It is well to remember that any physician who examines candidates for athletic competition and passes them, assumes the responsibility for their physical fitness. In a legal opinion by the consulting attorneys for the University of Nebraska, it was clearly stated that suit by an injured party to recover damages from the University for injuries suffered in athletic competition can be instituted only through legislative action. This governmental protection extends to everyone involved, coaches, trainers, assistant trainers, *except the physician*, even though he is a full-time employee of the State. *He must be individually responsible for his own decisions.* Thus, an injured player, or his parents, or legal guardian, can bring suit against the physician, without having to obtain legislative permission, should any element of foreseeable injury be in evidence. It is well to remember that fact when the sports writers, the coaches, the alumni, and even the parents, criticize your decisions. They are essentially immune to legal action.

But over and above all of that is the physician's responsibility to his patient, the boy. In the turmoil of adolescence, urged on by well-meaning parents who want their boy to excel, it is heartbreaking for a young man to discover that he is not physically perfect and that someone doesn't want him. It is difficult for a high school football hero to have to face his friends with the explanation

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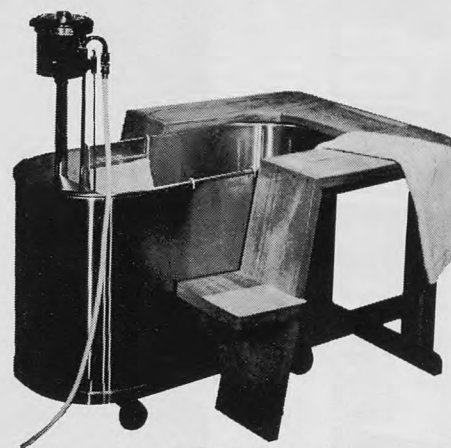
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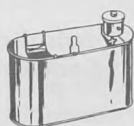
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**CONGENITAL ANOMALIES**

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that he has a bad back and cannot play, even though he is six feet, two inches tall and weighs 195 pounds. It is in this circumstance that the weak physician falters. "So what if he does strain his back? He will soon be out of sight and out of mind, and there will be other more immediate problems to occupy the mind." Over some ten, or eleven, years now, we have seen the results of this type of philosophy and action, and will not be a party to it. We urge similar action on all physicians responsible for preseason athletic physical examinations.

ACKNOWLEDGMENTS to Doctors F. Stone, and P. Goetowski, orthopedic consultants at the University Health Services and team physicians for the University of Nebraska.

**ATHLETIC DERMATOLOGY**

Presented at the Third National Conference on the Medical Aspects of Sports, November 26, 1961, Denver, Colorado.

by L. W. STAUFFER, M.D.  
Eugene, Oregon

*Continued from the February issue.*

**BACTERIAL INFECTIONS**

Superficial pyodermas, which are most frequently seen in wrestlers, are shallow, nonscarring, somewhat contagious infections of the skin that may be caused by several organisms. Most commonly encountered are the beta hemolytic Streptococci and Staphylococci. The Streptococcus is inclined to produce a honey colored crust, others a brown crust. It is frequently helpful before treatment to remove the crusts of these infections either by wet packs or by the use of enzyme containing ointments. Do not peel these crusts mechanically. Local application of antibiotic creams such as Neosporin, Vioform, Furacin or Triburon is usually effective. If healing is not evident in 48 hours, discontinue treatment for 24 hours and obtain culture sensitivity tests. Occasionally oral antibiotics are necessary when infection is widespread.

In the past few years, furunculosis has become somewhat of a problem. A boil is a deep infection of a hair follicle caused by a hemolytic Staphylococcus aureus. Necrosis of involved tissue produces on occasion a "core." An athlete with a boil should not participate in training or competition until the infection is healed. Boils above a line extending from the lobe of the ear to the angle of the mouth should be of particular concern. The possibility of thrombophlebitis of veins draining the area of a boil must be kept in mind. Multiple small boils scattered over the body sometimes mask scabies.

Treatment:

1. Do not incise a boil until fluctuant.
2. Do not squeeze, "cup" or otherwise mechanically interfere with these infections.
3. Culture for sensitivity testing immediately. There is a wide variation in antibiotic resistance in the Staph. group.
4. As soon as culture is taken, start adequate dosage by mouth of a wide spectrum antibiotic. Use one that is rating high on the average in sensitivity reports. Chloromycetin is the present choice in the Eugene area. Change drugs if sensitivity report indicates.
5. Parenzyme, Varidase or Chymoral properly used may speed healing.

6. Local massive dressings with an ointment such as Vioform, Triburon or Furacin, etc.
7. If a "core" forms, pack the area for 30 minutes with Varidase jell. Work the jell down into the open crater. After 30 minutes, much of the debris can be gently removed with a loop curette.
8. Twelve-hour dressings with Tryptar, Chymar, Elase or Parenzyme ointment may be substituted for No. 7.

In the management of infected abrasions, the following procedures are recommended:

1. Clean enzymatically.
  - a. Tryptar, Chymar, Elase or Parenzyme ointment dressings.
  - b. Varidase jell pack.
2. Aerosol antibiotic spray, three times a day.
3. Spectrocin lotion.
4. Protect mechanically from further trauma.
  - a. Parrecined lace mesh surgical dressing next to abrasion.
  - b. Layers of Kerlix gauze.
  - c. Tape.

Intertrigo or irritation with infection in moist sweaty areas, such as the groin and the axillae, is occasionally encountered. It is wise to keep in mind that yeast infections and seborrheic dermatitis also invade these same areas.

A suggested outline for the treatment of intertrigo:

1. Astringent wet packs, one-half hour, 3-4 times a day. (Domeboro tabs, 2 per pint of cool water.)
2. Terramycin topical powder or Vioform lotion.
3. Prantal powder.
4. Avoid nylon, wool or rayon fabrics.
5. Avoid excessive washing with soap and water.

Paronychia infections resulting from ingrown toenails may be due to a wide variety of organisms. A granulomatous response occurs frequently in the involved paronychia area if proper care is not taken.

Prevention of this condition may be aided by:

1. Cut toenails square across.
2. File a groove down the center of the involved nail.
3. Notch to the attachment of the nail in the center of the distal part.<sup>1</sup>
4. Avoid short or narrow shoes.
5. Avoid stretch type socks.

Outline of treatment:

1. Culture for sensitivity.
2. Remove a V-shaped section of nail edge with pointed short scissors. (Dental wire scissors.)
3. Antibiotics by mouth and locally.
4. Hot packs, MgSO<sub>4</sub>, etc., may be of assistance.
5. Surgical excision of "proud flesh" (granuloma pyogenicum) if it arises.

**ACNE**

Acne is not a deterring factor for participation in athletics. Severe, cystic acne should be referred to a dermatologist for care.

**NAEVI**

If a mole is torn, cut, severely bruised or scraped, it should be removed by surgical excision. This indication is debated hotly by some, but one incorrect decision can result in death if malignancy develops.

**TRAUMATIC BLISTERS**

Blisters are produced for the most part either by pinch-

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**ATHLETIC DERMATOLOGY**

(Continued)

ing of the skin, in which case the blister fluid is usually blood-tinged, by slipping of one layer of the skin over the other or by the rubbing of improperly fitting shoes or other equipment over the skin under pressure. We find ourselves concerned with blisters of the feet for the most part, particularly if a sticky substance, such as "tuff skin" (which is compound tincture of benzoin), is applied to the skin. When the outer skin stops faster than the deeper layers, blisters develop. If shoes are too large or too small, either in length or width, blister formation is enhanced.

Callus formation is the most effective protection against a blister. From two to six weeks, however, are necessary for adequate development of calluses, depending on the tenderness of the skin. Before a blister forms, a "hot spot" can be noticed in the area.<sup>2</sup> Continued aggravation allows tissue plane separation and vesiculation.

**Prevention of blisters:**

1. Fit the shoes. Do not allow the participant to be sole judge of proper fit. Grease the feet thoroughly with Vaseline, Silicote or powder. Discard flattened or worn sweat socks. Break in game shoes in practice. Cotton T shirts worn under shoulder and hip pads will take up some friction and help prevent blisters and abrasions.
2. Alert your squads to watch for "hot spots" in the early season. Immediate cover of these spots with smooth (waterproof) tape extending well past the area of friction will prevent blister development.

**Treatment:**

1. Immediate first aid can allow completion of the contest without loss of efficiency due to pain if a syringe, with sterile technique, is used to empty the blister and equal parts of Xylocaine or Blockain and Cortisone are injected into the blister through the same needle.
2. After 12 hours, unroof the vesicle.
3. Spray with aerosol antibiotic.
4. Cover with soft, fluffy, sterile dressing over Telfa sheet dressing.
5. Grease thoroughly with carbolated Vaseline before practice or game; remove and re-dress after session.
6. Plain, mild soap for cleansing.

**CONTACT DERMATITIS (DERMATITIS VENENATA)**

Poison ivy type eruptions can happen to anybody any time. We are not born allergic to substances. These reactions are developed sometimes only after many years of exposure. A partial list of possible causes of contact dermatitis in the athlete would include:

1. Tincture of benzoin.
2. Mercury compounds (Merthiolate, etc.).
3. Leather.
  - a. Chemicals used in tanning.
  - b. Dye.
4. Dye in uniform.
5. Rubber.
6. Tape.
7. Resin.
8. Plaster.
9. Lime or chalk.
10. Sawdust or wood shaving.
11. Sunlight.
12. Citrus peels.

During hunting seasons and other times when there is

Continued on page 12



## HE'S NO GOOD ON THE BENCH!

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**ATHLETIC DERMATOLOGY**

(Continued)

possible exposure to sensitizing weeds and shrubs, many other possibilities for trouble exist.

The symptoms include redness, swelling, blisters, itching and burning. There may be patches of eruption, lines or blotches or definite patterns of rash, depending on the area and pattern of exposure.

Management of contact dermatitis:

1. Identify and remove causative agent, if possible.
2. Avoid heat and friction to involved areas.
3. Steroid drugs.
  - a. ACTH, I.M.
  - b. Oral steroids.
  - c. Local preparations of steroid for small areas of eruption.
4. Anti-pruritic lotions locally:
  - a. Quotane lotion.
  - b. Thronathane lotion or aerosol spray.
  - c. Calamine lotion or linament.
5. Wet packs, if oozing and/or swelling are a prominent factor:
  - a. Burrow's solution.
  - b.  $MgSO_4$  solution, 2 tbs. per qt.

Wet packs to have their best effect must be:

  - a. Massive.
  - b. Open (not covered or wrapped in impervious material).
  - c. Good and wet.
  - d. Kept wet.
  - e. Loosely applied.
  - f. Cool.

Do not wet pack more than one-third of the body at one time. Pack may be used for 30 to 60 minutes at a time, 3-4 times per day.

6. Soothing, tepid, tub bath, using Aveeno, Soyaloïd, Almay or Ar-er tar bath.

**INSECT BITES**

Vitamin B<sub>1</sub>, 100-150 mg, per os daily, is a fairly reliable repellant for the highly susceptible individual.

**SUGGESTED TRAINING ROOM SUPPLIES**

1. Antibiotics, one of the following: (Replace Merthiolate, Metaphen or iodine).
  - a. Vioform cream or lotion.
  - b. Neosporin ointment.
  - c. Polysporin ointment.
  - d. Spectrocin lotion.
  - e. Neosporin Aerosol.
2. Fungicides:
  - a. Desenex powder.
  - b. Soprano powder.
  - c. Enzactin powder, ointment or spray.
3. Protective:
  - a. Silicote Aerosol spray.
  - b. Vaseline.
  - c. Rezifilm.
4. Burn cream, for minor abrasions and unroofed blisters:
  - a. Equal parts of Vioform cream and Tronothane cream; ½% to 1% Hydrocortisone may be added.
  - b. Lidamycin cream.

**CAUTION!** Do not throw used Aerosol bottles in waste to be burned. They explode.

**MEDICAL ASPECTS OF ATHLETIC CARE**

by SAMUEL E. LEARD, M.D.

Director of Student Health, Boston University  
Asst. Prof. of Medicine,  
Boston University School of Medicine

When the term athletic medicine is used, one immediately thinks of the care of athletic incurred injuries followed by appropriate rehabilitation. However, an athlete has other conditions just as any person of his age group, which may even influence the entire team if overlooked. The following comments are made with this in mind.

**Pre-Season Physical Examination:** Before undertaking strenuous physical activity in any sport a careful physical examination and history are a must. The following are illustrations of findings and decisions made thereby.

**Vision:** If a participant has no vision in one eye, he should be barred from contact sports. If his vision is worse than 20/40 in both eyes a decision should be made as to whether he can participate in a given sport without contact lenses or glasses. If he wears glasses, a risk is taken even though the glasses are shatter-proof. In football, possibly a tackle or an offensive center may not take the risk that a back, guard or end does with a vision of 20/100. **Hearing:** The player with a partial deaf ear may participate in most sports. However in football his coach, quarterback and fellow-players should know it or he may miss the signals.

**History of Head Injury:** Much has been written of late regarding head-gear and head injuries. Three head injuries severe enough to cause momentary unconsciousness and lapse of memory although transient, should mean a withdrawal from contact sports. A college team physician should have information on high school head injuries which may be obtained on his initial college medical history. Initial careful observation especially for six hours post-concussion is mandatory. Even if just the headache is still present, further observation is indicated. Any change of personality or behavior, even three months later, may mean venous extracerebral blood or fluid which is treatable and life-saving. The average football player even with mild concussion should miss the following game, in most instances.

**Cardiac:** On the physical examination, murmurs heard should be further investigated to determine whether they represent the scarred valves of rheumatic heart disease or are functional. Chest x-rays initially with measurement of the cardiac area and transverse diameter probably give the most fruitful information. This proves damage done by rheumatic fever and diphtheria in childhood, or rare other heart muscle damage diseases. While repeated routine chest x-rays are not indicated, one chest x-ray may be revealing in each entering student. The electrocardiogram is not particularly revealing as a routine screening procedure in this age group. It might reveal in the heavyweight professional football player or boxer early coronary disease especially if blood pressure elevation is present.

**Hypertension:** The initial elevated blood pressure recording is not an immediate cause of rejection from athletic participation. The underlying cause should be slight which may be nephritis, coarctation of the aorta and certain adrenal tumors. His family history should be reviewed in the evaluation. If all tests to rule out the above are normal, and the diastolic pressure is 100 or below and the systolic pressure is not over 180 mm, physical activity

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**MEDICAL ASPECTS**

(Continued)

is not likely to prove harmful. Conditioning may thereafter show a return to normal pressures.

*Kidneys and Urine:* Absence of one kidney should be an automatic rejection from contact sports. History of recurrent urinary infection should be investigated even though a routine urine is normal. It is possible to have only one functioning kidney with the presence of minimal urinary abnormalities.

A routine urine at the time of the athletic physical examination on two occasions at Boston University has turned up acute glomerulonephritis. 85% of these people can fully recover if they are put to bed under proper medical management. In the above cases neither boy gave a significant history except for loss of pep recently. Both had had respiratory infections just before summer vacation ended.

Routine urines immediately after exercise will show microscopic abnormal elements. If these persist beyond 24 hours further conditions should be considered including old injury.

*Liver:* A history of hepatitis should lead the physician to make sure that the player is fully recovered before participation. Should a boy complain of mahogany urine to a trainer he should be immediately referred for evaluation. In the absence of trauma to the kidney, mononucleosis or hepatitis are possible.

If hepatitis occurs, the entire squad, coaches and close associates of the player should receive immune globulin.

*Allergies:* The severe asthmatic is not apt to go out for a college sport. However, the lineman, in dust who has chronic nose blockage, or the basketball player with seasonal fatigue, non-productive cough and itchy eyes may have controllable hayfever. Under treatment they are better and they are less apt to pick up infections of the respiratory tract to pass on to others. One of our hockey players had a lot more stamina and no wheezing on excessive exertion (by tests he had dust sensitivity) after he was treated with desensitization.

*Other Situations:*

*Skin:* If the first boil which occurs on a squad is properly isolated and treated, it may prevent other players from acquiring staphylococcal infections. There are other potentially transmitted conditions such as ringworm and epidermophytosis. Towels and clothing should not be exchanged.

*Gingivitis:* Half a squad of football players complained of gums bleeding. They asked if it was due to their diet. As soon as the common water dipper was eliminated and treatment instituted on those who had it, no further gum bleedings occurred. Individual cups on the delivery of water from a hose which no one touches with his mouth is mandatory.

*Infectious Mononucleosis:* This disease is basically characterized by fatigue, swollen glands and usually a sore throat. Probably 25% don't have fever. Being a generalized disease the liver and spleen may be involved. To be palpated a spleen has to be enlarged about 2½ times. Certain ruptured spleens in contact sports have been in players with unrecognized cases of mononucleosis. Any player with sorethroat and fatigue which lasts for 5 to 7 days should have a blood smear examined to rule out this disease. The decision for return to contact sports is

rather difficult to make, but certainly my feeling would be a 4-week minimum.

*Heat Prostration:* In hot weather heat stroke is a possibility. Practices should be shortened and replacement of lost salt and potassium (orange juice is a good source) should be considered.

*Respiratory Infections:* Each student probably averages some two virus colds a year. The average symptoms last 3 to 7 days. If a sorethroat or fever is a prominent symptom the player should be checked. If the first case of hemolytic streptococcal infection can receive early penicillin (unless he is allergic to it), a team may not be as short-handed as if the disease invades the squad unrecognized. Antibiotics should not be used indiscriminately. If they are used, the proper duration of treatment is important.

*Gastro-Intestinal:* The best prevention of epidemic diarrhea in a squad is control of their food service. One year on a trip several boys apparently had a snack in an outside diner. The result was three ineffectuals at gametime. The viral type of diarrhea is less easily controlled than the food-transmitted bacterial variety.

*Immunizations:* There are reported cases of tetanus which have occurred from relatively minor cleat injuries in baseball, football and soccer. Certain football fields probably do not contain tetanus spores. However primary tetanus toxoid (NOT ANTI-TOXIN) followed by a booster in one year is good preventive medicine.

In years when there is a chance of influenza, influenza immunization is helpful. It should not be given to any person with a history of allergy to chicken-feathers or eggs since the virus for the vaccine is grown in egg embryo.

*Psychological:* It has been my experience that compared to the student body as a whole, an athlete is, as a rule, a fairly well adjusted individual. Only one of our athletes in recent years has been referred to our mental health department. However, many times a "well-considered-by-the-team" medical department can give advice and counsel in certain non-athletic type problems. If a hockey player is worried about his sick mother or a football player is concerned about a false medical fact circulating in a bull-session, a few minutes of a physician's time may lead to a better attitude toward team play and less sleepless nights.

*Non-Athletic Injury Prevention:* A team physician is interested in prevention. In a recent survey of seniors one out of seven men was injured in automobile accidents in four years. How many of your squads know this?

Soft drink bottles in a locker room may be broken. Have the boys use cans or pour the soft drink into paper cups. It prevents glass in feet.

Rough housing and running in dormitory corridors is another source of injury. We lost a half-back this year with fracture of the fifth metatarsal in a dormitory accident.

*Summary:* Athletic medicine has other contributions to make to the coaches, trainers and players of athletic teams than just the diagnosis, treatment and rehabilitation of athletic-incurred injuries. By utilization of physicians with a medical background, in addition to specialists in surgery and orthopedics, the individual medical problems can be prevented or treated to help keep the team's roster at nearer 100% efficiency.

## ATHLETIC MEDICINE IN THE SMALL COLLEGE

by CHARLES H. HOWARTH, M.D.  
Director, Student Health Service  
University of New Hampshire

During the period since the end of World War II there has been an extension of interest in athletic medicine by the colleges and secondary schools on the one hand, and by the medical and dental professions on the other. The old concept of having a doctor sit on the bench at Saturday afternoon's football game has given way to that of the team physician who is interested in the care and feeding of athletes, their conditioning, the development and use of improved protective equipment, and the employment of modern therapeutic techniques. He works closely and harmoniously with the trainer, the coaches, and the players themselves. This paper is intended to show how one moderate sized school, with a limited staff and budget, provides satisfactory medical care for its athletic program.

The University of New Hampshire is a state supported land grant college in a small New England town, located about sixty miles from metropolitan Boston, and having a student population of approximately four thousand. It has a health service housed in an adequate infirmary and staffed by two full time physicians and six nurses. Facilities at the health center include in-patient and out-patient care, laboratory for routine procedures, x-ray equipment, whirlpool, infra-red, diathermy and ultra sound. There are four orthopedic surgeons practicing in the general area who, while they are not members of our staff, are available for consultation and definitive care of specific cases. The local dentist is called upon for consultation and treatment of dental injuries.

New Hampshire engages in a comprehensive athletic program fielding both varsity and freshman teams in football, cross country, basketball, ice hockey, track, skiing, baseball, and lacrosse; and competent personnel are employed to coach these sports. There is one trainer attached to the athletic department who works full time as a trainer during the football season, but who coaches skiing in the winter and assists with track in the spring. Relations between the coaching staff, the medical service, and the trainer are close and cordial, and a feeling of mutual respect and appreciation exists. The athletic department has no hesitation about consulting the health center concerning conditioning of athletes, proper diets, prevention or treatment of injuries, or use of certain protective equipment; and the coaches welcome the physician's taking the responsibility for deciding who is physically unfit to play and how long he will be under treatment. Because of this situation, the player forms a feeling of trust in the physician and will freely seek his aid and advice.

All participants in varsity athletics are examined by the university physicians at the start of the respective seasons. This physical includes notation of the pulse and blood pressure, examination of the heart and lungs, and a check for hernia. Perhaps the most important feature of the first contact with the athlete each season is the questioning as to history of previous injury, since this allows for special attention to the part concerned and for recommendations of proper care to prevent aggravation or re-injury. Freshmen are not generally examined by the physicians because of limitation in the size of our staff, but lists of freshman team members are sent to the health center and are checked against their pre-admis-

sion history and physical forms before they are allowed to play. Only those freshmen revealing some disability or defect noted by the family physician are called in for our personal observation and decision whether they can participate in the sport. With a small medical staff, that has many other responsibilities besides athletic medicine, it is impossible to have a physician attend practices even in the more vigorous contact sports. The trainer is present at all football practices, but the coaches must see that injuries are sent to the proper medical facility in all other sports. Our infirmary is centrally located on the campus, and experience has shown that a physician can readily be called to the playing field or practice site in the event of a severe emergency. More usually the trainer or team manager can bring a fracture, sprain, dislocation, or laceration to the health center for definitive therapy. All taping and strapping is done by the trainer, and he will initiate and follow through on treatment of minor strains, contusions, or abrasions. The physicians see all other injuries, interpret x-rays when indicated, suture lacerations, establish diagnoses, and order therapy. They also decide what players must be referred to the specialist. Infra-red and whirlpool may be used at the field house under the trainer's direction, and all forms of physiotherapy previously noted in this paper are administered at the infirmary by the nurses. Antibiotics, enzymes, and injections are dispensed by the team doctors.

A university physician is on the bench at all football games and goes onto the field to evaluate all, save the most minor, casualties. He is prepared to determine the extent of the damage and to decide whether the player may continue in the contest. He and the trainer render first aid at the field side, and the physician may remove a seriously injured player to the infirmary via the university ambulance. Many colleges playing at our level of competition do not travel with a physician, and so we are prepared to offer aid to teams from either side of the field. About three years ago we initiated the practice of attending all away football games, and have felt that this is worthwhile as it removes responsibility for medical decisions from the shoulders of the trainer or coaches. During that first season we had several severe lacerations that were sutured during the game, and players that would otherwise have been lost for the day were returned to service; a ruptured kidney that did not become evident until the team was well on the way home and that had to be hospitalized in a neighboring state; and a fractured navicular. Subsequent seasons have continued to prove the value of this *modus operandi*. All home hockey games are covered by one of the university physicians. During our seven years in this service the largest number of accidents have been lacerations, thus allowing the participants to return to skate in their regular turns. Occasionally, a more extensive laceration is removed via automobile to the infirmary for suturing. We have seen no fractures or dislocations from hockey, only a moderate number of contusions and strains, and two eye injuries that were followed by one of the local ophthalmologists. We do not have a physician in attendance at other athletic contests as occurrence of injury has not been common enough to warrant a doctor's continual presence. It is not to be inferred that serious or disabling injuries occur in no other sports, in fact one of our more serious fractures (humerus) occurred in varsity basketball practice; but we have found that the injury may be brought to the health center, and if it is deemed too severe to move, a physician may be summoned from his office at the in-

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## ATHLETIC MEDICINE

(Continued)

firmly to the playing area in the matter of a very few minutes.

It is felt that a large staff is not necessary to the pursuance of good athletic medicine, but an interest in athletics and an understanding of the problems confronting the coaches and players is the essential ingredient to the successful establishment of an effective sports medicine program.

### FIELD DECISIONS IN ATHLETIC INJURIES

by ERNEST R. BIGGS, JR.

Reprinted from *The Ohio State Medical Journal*, August, 1961

The material to be covered here will be considered only from the aspect of the person who first sees the injury. This might be the athletic trainer or it might be the high school coach. The doctors who care for the injuries received in athletics should make it a point to teach the full time trainer or the high school coach the basic fundamentals of injury recognition.

#### Primary Considerations

The most important decisions a trainer or coach has to make when he encounters injuries in athletics are those made on the field at the time the injury occurs. He must consider:

1. The possible extent of the injury.
2. The possibility of keeping the athlete in play.
3. Immediate protection for a minor injury.
4. The problem of transporting the more seriously injured boy from the field.
5. Getting help to the field or getting the boy to help.

An analysis of the injuries to which athletes are subjected will show that the serious one is relatively rare. It is important that someone be present who is capable of ruling out the exceptional and is prepared to handle the common, less serious injury.

A few generalizations are important before proceeding to specific situations. We must look at the athlete first. Quick decisions in determining the extent of an injury are important to the injured boy and to the coach. The athlete demands three things when he is hurt.

1. *A quick, accurate interpretation of the injury.* Don't hesitate to discuss this with him and also to explain some of the procedures used in arriving at a decision.
2. *A prediction as to how long will he be away from participation.* Don't hesitate to explain why it takes time for these injured tissues to heal.
3. *An absolute recovery.* He expects this recovery faster than nature, even with the physician's help, can accommodate him under ordinary circumstances.

Remember that dealing with an athlete is different from the usual patient a doctor sees. He is a strong, healthy individual with a great desire to return to competition. A little sympathy during the early phase of the injury will calm a strong impatience and restlessness.

Injuries that occur in athletics are not necessarily peculiar to sports. They are "accidents" which occur to the individuals participating. Even here there are some who are more accident prone than others.

#### Helpful General Principles

Following are some general principles that might be helpful in management:

1. *Knowing the boy is one of the biggest assets.* Pain threshold is an important guiding sign. Know his reaction to pain and to the injury.
2. *Know the basic fundamentals of a sport.* This will help when a decision has to be made on whether or not a boy may continue play. Be decisive in the decision and don't say, "well if —." There is no half speed in sports performance.
3. *Be alert.* Actually the trainer watches to see who gets up last, not where the ball went.
4. *Get to the injured player as quickly as possible.*
5. *Don't get excited.* Don't hurry the check, but make it fairly thorough under the circumstances. Take as much time as is necessary and report any official who tries to speed up your decision.
6. *Instruct players on the team to leave the injured boy alone.* Nothing looks worse than to see a player grasping an injured boy by the belt and begin pumping him up and down.
7. *Don't straddle an injured player.* This is a good way to join the ranks of the injured.
8. *Take something with you on the field.* This may be just ammonia capsules, bandages, and tape.
9. *Know how to recognize the exceptional injury.* The normal and average injuries are handled routinely. Fortunately the greatest percentage of injuries are minor.
10. *Watch the play.* When the injury occurs an idea of what to expect should make the first check easier.
11. *Get him up slowly.* When rising is possible, the injured should be brought straight up, pausing momentarily in each phase.

#### Special Circumstances; Special Management

There are times when situations of doubt arise and the trainer needs and wants help. These injuries require an accurate check and proper transportation when moving is advisable.

1. *Head injuries.* Is the boy unconscious and for how long? Is his tongue in normal position? Is his mouth open or closed? Is he breathing normally? Keep him in the position in which he is found until help arrives.
2. *Injuries to cervical, thoracic, and lumbar spine areas.* This boy can't be moved and immediate help is imperative. Keep the boy quiet and reassure him.
3. *Internal injuries.* Any direct contusion to the abdominal area needs an immediate accurate diagnosis before moving.

Many serious injuries must be recognized by the trainer on the field and proper transportation must be obtained.

1. **Fractures.** These are not always the problem some may presume because, fortunately, many of them are evident. The fractures of the bones of the foot and wrist and hand, are, of course, not as easily identifiable as are those in larger bones, but they also do not present the pressing urgency that do the other areas.

2. **Ankle Injuries.** The biggest decision in this instance is one of transportation from the field. These checks might be made first before the boy is moved.

- A. Compression over both malleoli simultaneously will give a quick check for potential bone involvement.

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**FIELD DECISIONS**

(Continued)

- B. Palpate the area. Check anatomical alignment.
- C. Pain above the malleoli—potential fracture. Pain below the malleoli—potential sprain.

3. **Knee Injuries.** Here again the biggest decision is method of removal from the field.

- A. Check quickly the position of the foot and the position of the patella.
- B. Check the medial and lateral collateral ligaments, first in complete extension and then in slight flexion.
- C. Check for normal joint range.

The boy with a knee injury and possible joint involvement should always be removed from the game and given an opportunity to cool off for a short period. This will give a truer picture than is present while his body is still warm.

4. **Shoulder Injuries.** The decision here is one of whether or not to permit continued play.

- A. Palpate the clavicle and the acromio-clavicular area with light pressure placed on the acromio-clavicular joint.
- B. Check the deltoid area for normal anatomical position and test for range of joint motion, and shoulder girdle restriction of movement.

5. **Muscle Injuries.**

- A. Check the boy's reaction. Typical reaction to an actual separation of the muscle fibers is a sensation of someone hitting or kicking him.
- B. Palpate the area. If seen quickly before the exudate organizes, an actual depression at the site of the fiber separation can be felt and, in some instances, is visible.
- C. Place a mild stretch on the muscle which will produce enough pain at the site of the injury to give the exact location.
- D. Contract the muscle against mild resistance to test if there has been a loss of power due to the injury.

Two important principles may be suggested in summarizing. (1) Never take a player from the field with feet dragging or head lolling. (2) Always stress prevention of, rather than care for, injuries.

Remember also that injuries in athletics require, and the boy deserves, an accurate, quick recognition of the potential severity. Become acquainted with severe and critical injuries which need prompt care.

## ACUTE FOOTBALL INJURIES OF THE BRAIN AND SPINAL CORD

by MARTIN PETER SAYERS, M.D.

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Football injuries to the central nervous system and its coverings predominantly involve the head. Of the serious ones "cerebral" concussion, the most common, is by definition any alteration of state of consciousness caused by a blow transmitted to the head. This response can be caused by chest or spine injuries and may be produced in conjunction with a wide variety of underlying brain pathology. Probably most often there is little or no microscopically demonstrable brain lesion in the briefly concussed player.

Cerebral edema is more commonly symptomatic in players 15 years or less of age. The younger players so

injured occasionally manifest increasing lethargy with vomiting and confusion, indistinguishable from the symptoms of developing epidural hemorrhage. It is mandatory that such a player be hospitalized immediately for observation by a surgical team capable to perform emergency craniotomy.

Repeated bouts of concussion raise the possibility of atypical convulsions; an electroencephalogram may clinch the diagnosis. Somewhat arbitrarily the author feels that four bouts of concussion in one football season should preclude further body contact athletics for one year. There is some existing tendency to over-treat head trauma for indefinite reasons. Experience has shown that it is often more crippling (from a psychological standpoint) to inactivate or confine a player than to allow him to set his own return pace as he remains asymptomatic.

### X-Rays of Skull

X-rays of the skull are important. The rare accompanying simple linear fracture is ordinarily not serious, but requires a week of prophylactic antibiotics and five days of hospital observation if the base of the skull is involved. This is because such a fracture is likely to be compounded into potentially infected air sinuses and threatens basal meningitis. X-rays demonstrate basal skull fracture in only about 50 per cent of cases; the classical clinical signs are rhinorrhea, otorrhea, blood in the external ear canal or behind the drum, ecchymosis around the occipital arteries and orbital ecchymosis, especially in the absence of evidence of contusion to the eyes. A fracture line across the middle meningeal artery groove, especially with swollen overlying temporal muscle, requires careful observation for epidural hemorrhage.

Trauma causing serious intracranial hemorrhage need not cause unconsciousness. Subarachnoid hemorrhage, most often manifested by rapidly developing headache and stiffneck may result from brain contusion, laceration or a torn vessel. If uncomplicated, the fluid will clear in 8 to 14 days and the lesion heals sufficiently for return to body contact sports in four to six weeks. Persistent headache, dizziness, or other visible neurologic residual as paresis or cranial nerve abnormality are contraindications to return to active contact.

### Careful Observation Mandatory

In general, observation following serious head trauma should be keyed for the two most serious and rapidly developing complications, epidural hemorrhage and acute subdural hemorrhage. Neither one can be accurately predicted or is invariably accompanied by skull fracture. Both will usually become manifest in the 24 hours subsequent to trauma and have serious tendency to accelerate rapidly as they develop due to increased number of bleeding vessels as the lesion enlarges. It is not necessary or feasible accurately to differentiate these two potentially lethal or crippling conditions. Deteriorating state of consciousness is by far the most important of the "vital signs" to be followed. Accurate and regularly repeated evaluation of verbal responses or withdrawal from painful stimulus must be made until the threat has passed.

Classically but not invariably, the patient with rapidly developing intracranial hemorrhage may pass through a state of "lucidity" following brief concussion, and then progress toward stupor. During this process unilateral brain compression frequently causes ipsilateral pupillary dilation and contralateral Babinski progressing to hemiplegia, the Weber's syndrome. The pressure tends to slow

Continued on inside back cover

## ACUTE FOOTBALL

(Continued)

the pulse and raise the blood pressure. Development of headache or any neurological sign during the period of observation should tend to precipitate immediate search for neurosurgical consultation.

### Cord Injuries

Changing the focus to spinal cord injuries, one may categorically state the following maxim: Any persisting pain around or radiating from the spine requires immediate suspension of play until it is thoroughly understood. Experience has shown that small fractures and torn ligaments can be converted to paralyzing spinal cord injuries by a small increment of trauma. Needless to say, such an occurrence is not common. Nature ordinarily splints the spine relatively effectively; in case of doubt, slight extension of the affected area is preferable in moving the patient because of the stronger anterior ligaments and bones of the spine.

Radiating pain may be due to cord or root contusion, fracture or dislocation or acutely herniated intervertebral disc. X-rays are indicated and may be helpful. Although accurate differential diagnosis is sometimes difficult or impossible, the persistence of symptoms is clearly a contraindication to resumption of stressful athletics. On the other hand little is gained by the use of a splinting appliance unless for specific indication.

Paralyzing spine injuries are unusual, and fortunately not always catastrophic. Prevention of additional spinal cord insult due to additional motion at a fracture-dislocation site is the important immediate consideration meriting special squad instruction and training. Luckily, by far the most common cause of immediate paralysis (partial or complete) is spinal cord shock. It should be further noted that our elation at returning function in the first few seconds or minutes can allow ill considered mobilization, as hypalgesia at an injured site may persist beyond the period of paralysis.

A peripheral nerve contusion or avulsion is more common than root evulsion or spinal cord contusion, and can usually be differentiated by zones of sensory deficit or oscillographic measurement of nerve conduction time. Because of the rather marked mobility of the spine, any proven injury of the cord or bony spine will usually contraindicate further competition for a six month period but rarely precludes football in a later season if the player becomes asymptomatic.

As in all fields of medicine prevention is always more important than treatment; however, this is not the subject of this treatise. The bony protection of the central nervous system makes diagnosis somewhat complicated, but anatomical focalization of function rewards a careful examiner. The importance of a changing clinical picture cannot be overemphasized.

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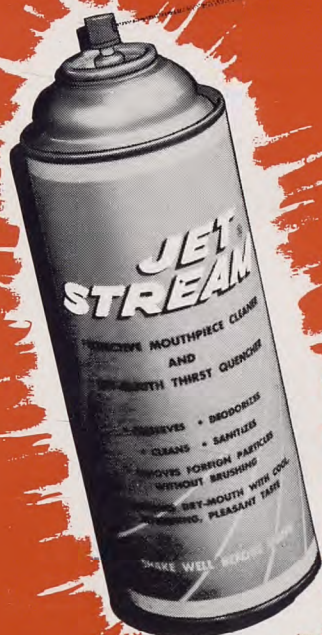
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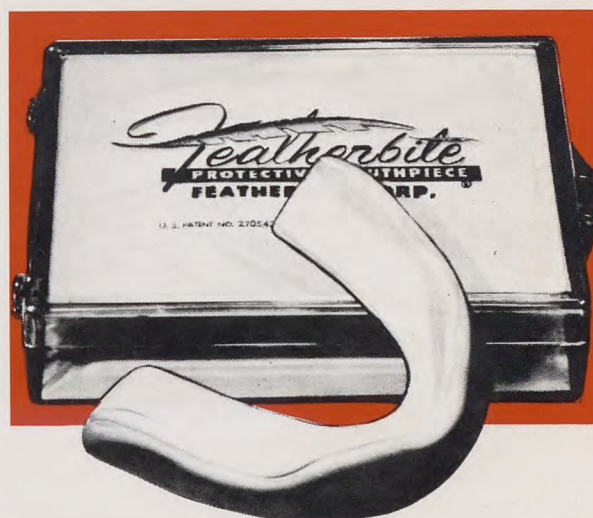
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