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THREE CASES OF FRACTURE OF THE SACRUM

BY
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Literature concerning fracture of the sacrum is very scarce. Very little is to be found in the comprehensive literature of fractures, and the disease is just mentioned in the manuals and text-books, with no special directions of its diagnosis and treatment.

Few authors have treated the subject directly. I have not succeeded in tracing more than 55 published cases, which leave the hypothesis that this kind of fracture is extremely rare.

The most comprehensive work, published in the last 10 years, which I have been able to find about this subject, is an article in a monograph by *Vesterborn:* "Beiträge zur Kenntnis der Beckenfracturen und Beckenluxationen". He has a material of 20 cases, and this is by far the largest body of facts existing. *Bentzon* has published 3 cases in "Bibl. f. Læger, 1927", at the same time quite thoroughly describing its diagnosis and special roentgen conditions.

Judging from the cases, which we have treated, the fracture of the sacrum belongs to the more serious lesions. Its diagnosis and prognosis also show certain things of interest, which I shall go through later on.

Two of the three cases which I am going to mention, we have had in this hospital within the 18 months it has been opened, and in that space of time more than 3500 patients have visited the ambulatorium, but of these only a small part (110 patients) are patients with fractures.

Bentzon has treated the third case in his private clinic in Aarhus, and I am much indebted to him for his permission to publish it.

Case I.

H. M. 45 years old, female.

Two years ago, going downstairs, the patient fell on her back, feeling a violent pain, localized to the middle of the sacral region.

She was able to rise and walk immediately, but it hurt a great deal, and she had to stay in bed for a few days. However, her condition was not so bad that she felt inclined to consult a physician. During the following year she still had a pain, and periodically it was aggravated. She had the feeling that the sacral region swelled during these periods of pain, and I suppose that was why she consulted a physician, however not until one year after the accident. She was roentgen-examined, but the roentgenogram did not show any abnormity. She was given diathermic treatment and massage, but without any result.

When the patient came to us, her complaints were as follows: Pains in her back about the middle of os sacrum, most painful when she was sitting, but sometimes it also hurt during the night. When she walked she had no pain in the sacral region, but in the lumbal and lower dorsal region, sometimes rather annoying. She also complained a good deal of spasms in the back of her legs. No pains at defecation or urination. Menstruation was regular, but the pains generally worse during this period.

The patient has been operated for abdominal diseases several times, the last time four years ago.

Physical examination: Her gate is natural, but she sits down very carefully and with a slight stoop. There seems to be a diffuse swelling of the sacral part, but otherwise no symptoms of inflammation. By palpation nothing abnormal was to be found, but the patient states intense and distinct tenderness about the middle of the sacrum. While stooping she complains of slight, painful spasms in her back, otherwise no indirect pain.

There are no symptoms of nerve injury, no deformity of the pelvis or back. Free mobility of the coxae.

Roentgen did not show anything abnormal by frontal pro-

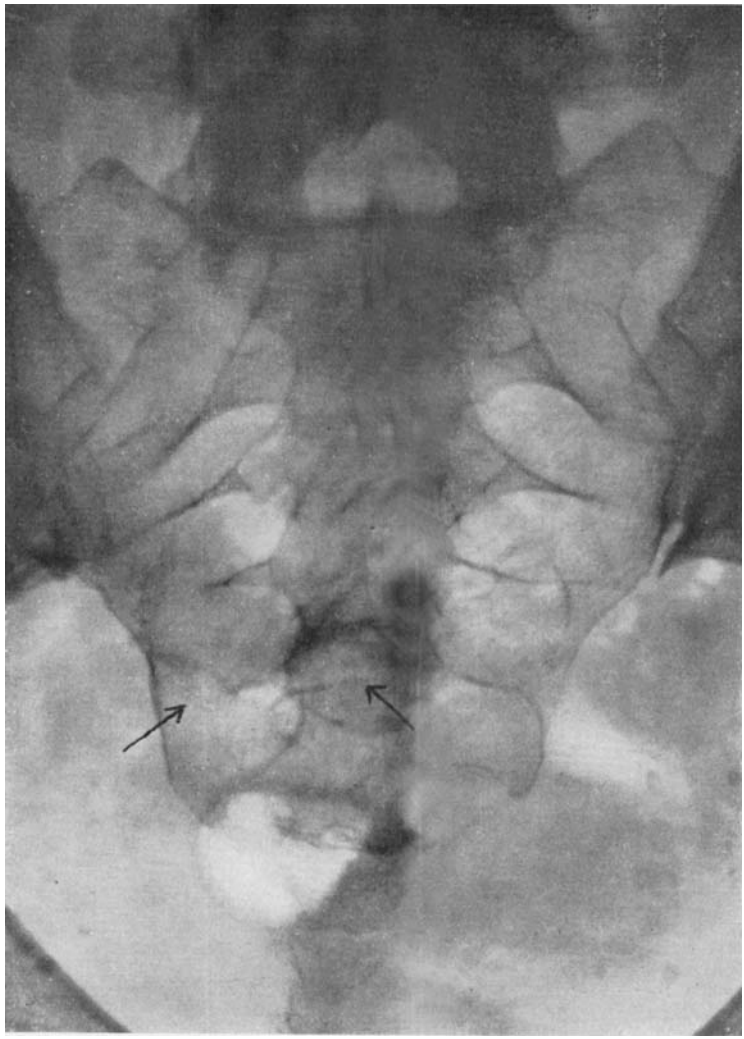

Fig. 1.

Case 1. Some irregularity of the structure of fourth segment can be seen, (where the arrows point) but no real fracture line.

jection. Several negatives and stereoscopic pictures were taken, but no fracture could be proved with certainty. However, a profile picture showed an oblique fracture through the 4th segment and probably another fracture through the lower part

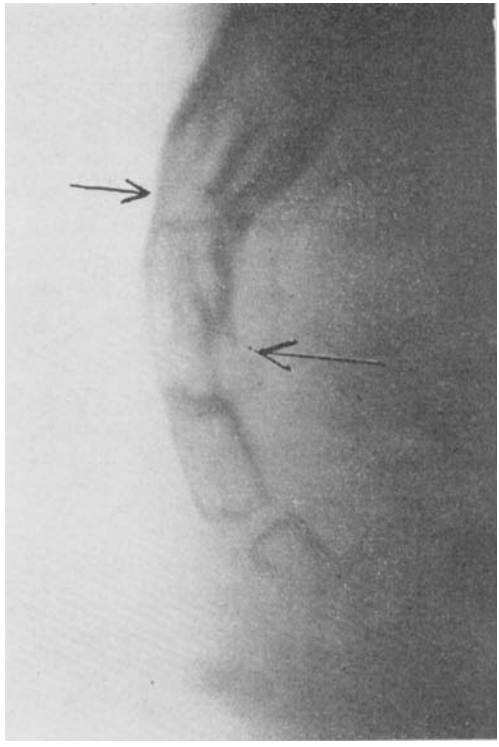

Fig. 2.

The same patient as in fig. 1. An oblique fracture line can clearly be seen through fourth segment, and another somewhat higher (see the arrows). The intermediate fragment (between the arrows) is dislocated forwards.

of the 3rd segment. At the first examination a dislocation ventrally of 1. cm. of the distal fragment seemed to be present. No callus formation was to be seen.

As the fracture was two years old, it would hardly be of any use to take measures for any real fracture therapy, but

the patient was advised to get a hard cushion to put at the front edge of the chair, a cushion of such a form and thickness that when sitting, the patient will charge the upper part of femora instead of the tuber ischii. Also thermic treatment was recommended.

Two months and a half later the patient was re-examined. Her condition was practically unchanged. She is not able to use the said cushion for more than an hour at a time on account of cramp feelings in her legs. The pain in her back is rather annoying. There is still quite a pronounced soreness of the sacral region. By rectal exploration disconfiguration of the frontal surface of the sacrum cannot be found, but the lower part of the sacrum is movable to a rather high degree, and at the examination of mobility the patient stated a great pain about the middle of the bone.

At the control examination several profile roentgenograms were taken. The dislocation now seemed less pronounced; on some of the pictures the fracture presented itself distinctly, on others it was hardly possible to discern it.

Case II.

S. J. A. 50 years old, railway workman.

14 months ago the patient was injured while loading a truck. He was standing with his back to some iron sheets which stood on edge, and while bending down quickly to lift a box, he bumped his back against the iron sheets and felt severe pain. He was able to continue his work immediately after the accident and did not consult a physician until a week after.

The patient had a great deal of pain, especially localized to the sacrum, but radiating into the lumbal region and back. He noticed that the sacral region was dark-blue. The pain was worst when the patient was working, especially when he had to stand up during a railway-ride, and also if he had to sit on a hard chair. When he lay down, he did not feel any trouble and but little when walking. No symptoms of bladder injury or pain by defecation. He had to keep his bed for a couple of

months and was treated with injections, as the doctor probably understood it to be rheumatism. He improved slightly better, and after about 6 months he tried to resume his work, but as the pain grew worse again, he had to give it up after having worked for two months.

Then be was sent to an invalid resort for 70 days and had diathermic treatment. After his return from the invalid resort, he was still not able to work and so stayed at home for two months. Then he was treated once more, and this time with roentgen. He felt a slight improvement and now he could resume his work, but his condition has grown worse again.

Now the patient complains of pain in the sacral region, radiating into his lumbal part and back, still not so bad as before, and then he has a feeling of numbness in his legs from his knees and downwards. He complains a good deal of headache, nervousness, and that he gets tired too soon.

The insurance company had sent him to a neuropathist who sent him to us. I got the impression that he was considered a simulator.

Physical examination: The patient makes the impression of being somewhat nervous and depressed. He walks warily, and when sitting down, he does so with the utmost care and in such a manner that he mainly rests on the left half of his back. On palpation he states an intense soreness towards the middle of sacrum.

Otherwise the examination did not show any abnormity except an eczema-like skin affection on the inside of the right crus (this began four years ago). There is no indirect soreness. No distinct nerve injury, no deformity of the pelvis or back.

A radiogram of sacrum, with frontal projection, does not show anything abnormal, but with a profile projection a rather distinct bending of sacrum is seen, corresponding to the third segment, also some irregularity of the contours, so one may surely conclude that the case is that of a healed fracture.

Case III.

K. H. M. 30 years old, nurse.

A year ago the patient fell when ski-running in Greenland; on account of the great speed, neither she nor the eyewitnesses were able to state exactly in what manner she fell; still, she supposes that she fell with her back against a stone. She did not lose consciousness, but immediately after she felt severe pain in the lumbal and sacral region, intensified through movements.

At an examination made by *Dr. Krelstrup,* Julianehaab, a short time after the accident ecchymoses were found all over the sacral region. Furthermore there was diffuse soreness of abdomen.

On the same day and the days following the accident there were several vomitions, but otherwise the functions were normal with no symptoms of abdominal injury. There was no dysuria or pain at defecation. On exploratio rectalis no soreness or distinct abnormities were to be found.

The patient was treated by confinement to a bed with a wooden bottom. After three or four days she felt better. The soreness was localized to the sacrum and lower lumbal region, and the other symptoms disappeared. Three weeks later she began to get about again, and after a short time she was able to resume her work.

However, there still remained some pain and feeling of fatigue in the lumbal region which especially appeared when stooping. Still there were no symptoms from the sacral region, except a slight soreness on pressure and on lying down.

On account of this lumbal pain the patient consulted *Bentzon* 4 months after the accident. At the examination a small gibbus corresponding to the 2. lumbal vertebra was found and also soreness on pressure against the back of the sacrum. No symptoms of nerve injury, except a slight hypaesthesia of a little part of the nates to the left of sacrum. The other clinical examinations did not show anything abnormal.

On the other hand roentgen examination showed a comminute fracture of sacrum. Both massa laterale are broken, and

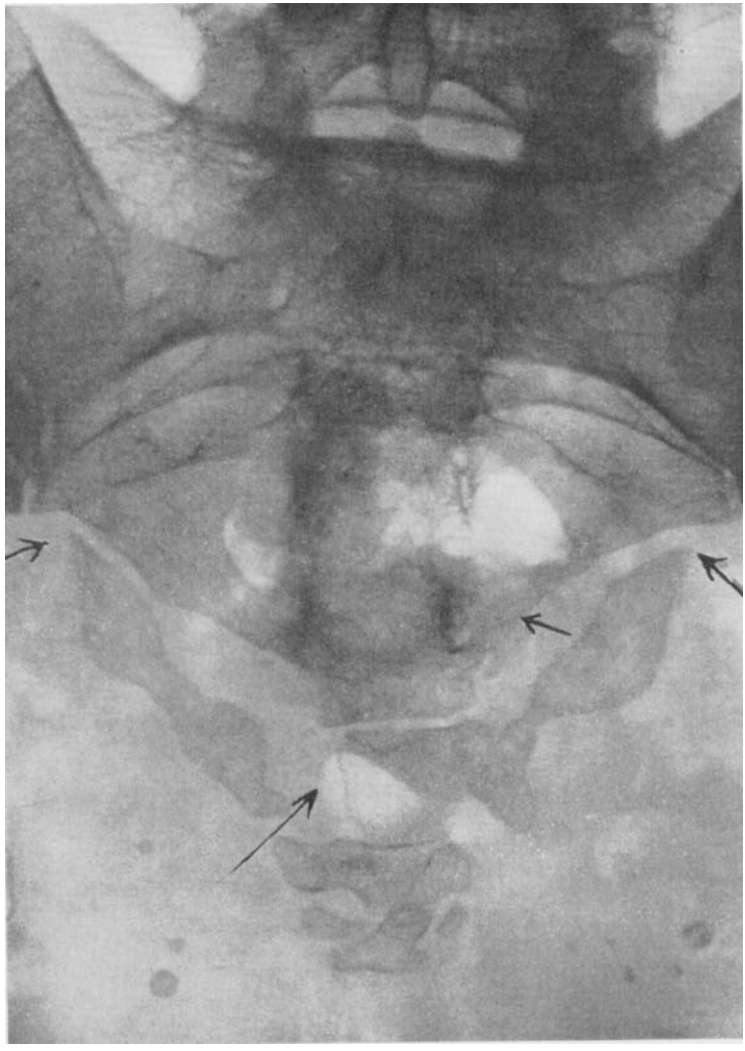

Fig. 3.

Case 3. Both massa laterale are broken from the corpus of sacrum and there is a vertical fracture of the fifth segment. Besides this a transversal fracture line can be discovered through the fourth segment. (See the arrows.)

there is a rather big diastase of the fragments. Through the 4th segment a transverse fracture line is just discernible. There was also a compression fracture of the first and second lumbar vertebra with moderate wedge shape of the corpora.

The patient was now treated with movement-cure, and by and by she became quite free of symptoms and wanted to resume her work in Geenland.

At control examination in a tuberculosis hospital, which was made out of purely formal reasons, an open tub. pulm. was found. Control roentgen examination made in the tuberculosis hospital a year after the accident shows the transverse fracture healed. The fracture of massa laterale still show no inclination of healing or new bone formation.

Still the patient is free from symptoms from the fracture.

The rather invalided state of the two first patients, now 2 years and 18 months, after the accidents, respectively, seems to me to prove the serious character of this fracture. As it is surely of great importance to the effectivity of the therapy that the fracture is diagnosed and the treatment begun at once, it is necessary in cases of injury of the sacral region to make quite a close examination, clinical as well as roentgenological.

In most cases of fractures roentgen examination is absolutely the safest and easiest way to make a sure diagnosis. As to the fracture of the sacrum it is somewhat different, and *Bentzon* states the difficulty of the roentgen examination as the possible cause of the fact that this fracture has been surrounded by so much silence for the last thirty years, or since roentgen examination was introduced into the clinic. *Ludloff* (in Forschr. a. d. Geb. d. Roentgenstr. 1906) emphasizes the difficulty of getting a good roentgenogram of the sacrum and warns against taking the result of a roentgen examination as decisive for the diagnosis. Only positive results give sure information. To prove this, *Ludloff* took a skeletal preparation of a sacrum fracture from a museum and made a roentgenogram of this. The fracture line was hardly visible, though the bone was naturally placed

level with the negative, and though it was not surrounded by the natural soft parts.

There are several facts which make roentgen examination so difficult. The bone is formed very irregularly, and the contours are very rough. Moreover, it cannot be placed level with the negative, in which case — by the usual projections — the

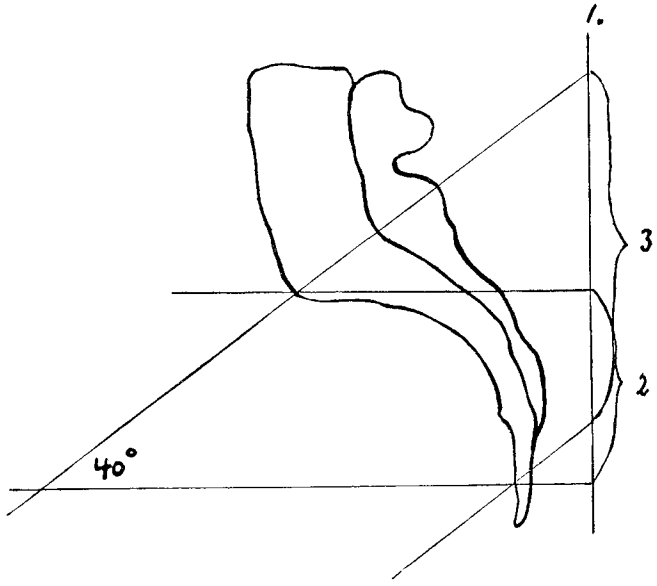

Fig. 4.

Schema to show the difference in the length of the roentgen picture of sacrum by frontal and slanting projection respectively. 1) negative. 2) the length of the picture by frontal projection. 3) the length of the picture by projecting the x-rays at 50 degrees angle to the frontal plan.

rays pass more or less slantingly through the upper half of the bone so that the picture is shortened and falsified.

As the fragments in typical transverse fractures as a rule partly overlap each other, it is obvious that only by severe fractures with considerable dislocation the fracture line can be seen by frontal projection.

To be sure, one gets a less falsified picture by projecting the x-rays slanting against the pelvis, in such a way that the

symphysis will cover the os coccygis (see fig. 4.). But neither in this manner we were able to show the fracture of the two first patients. In case of a vertical fracture one must of course not omit to take a frontal picture.

Consequently, in first place the profile picture must be taken. This requires a rather strong apparatus, and in stout patients it is very difficult to get good profile pictures. And here also the roughness of the bone highly complicates the judging of the roentgenograms.

On account of the violent exposure and the distance from the negative the contours of the bone are rather obscure so that a fracture is hardly to be discovered unless there is quite a distinct dislocation or diastasis of the fragments. One has no hope of seeing a fissure or infraction if there is not a real bending of the bone as in the second patient.

On some of the last pictures, which we took at control examination of the first patient, it would hardly have been possible to discern the fracture if we had not known that it was there.

As mentioned before, roentgen examination is not so satisfactory as was to be expected. So the examiner mainly has to put his faith to the clinical examination, and though the sacrum belongs to the so-called occult bones it is comparatively easily approachable for direct palpation. Of course, the symptom, which is most constantly present is pain in the sacral region itself, which is strongest when the patient is sitting down. Concerning the two first patients, pain in their back, paraesthesis and cramp feelings in their legs were the most embarassing symptoms. This is probably the result of the fact that the patients unconsciously occupy constrained positions to discharge or immobilize the sacrum and so rarely relax. It was characteristic for both of them that they made an increased lumbal lordosis when sitting.

Nerve injuries seem to be scarce, a surprising fact, as the nerves from the 4th sacral segment pass the place of the most frequent transverse fracture, but probably it is the consequence of the fact that any large disclocation of the fragments is

very rare, owing to the strong ligaments. Also new bone formation does not seem to take place to any extent, so that there is hardly any danger that the nerves will be embarassed by it.

Difficulties with the vesica and defecation seem to be more frequent, though by far not always present. In one of the cases of *Bentzon* the patient had fever which he thought was caused by phlebitis on the front part of sacrum, where he found a soft intumescentia.

Rectal exploration is of the greatest importance to the objective examination. I do not think that it is possible to reach as far up as to the seat of the fracture, but the mobility of the lower part of the sacrum can be examined, and by this, in case of a fracture, the patient will feel a strong pain somewhat further up than the exploring finger can reach.

Bentzon employs a special method to produce this reaction of pain. It is based on the fact that the pyriformis muscle issues from the front side of sacrum and is attached to trochanter major. Normally it works as external rotator, but by flexed thighs as abductor. By letting the patients in sitting position try to abduct his legs, while the examiner at the same time with his hands forces the knees of the patient together, a strong contraction of the pyriformis muscle can be obtained, which then draws the sacrum somewhat forward. In fractures one may expect that the fragments at the same time will be somewhat dislocated, which will result in pain reaction.

If the fracture is low, and the pyriformis muscles issue excessively from the proximal fragment, one cannot expect this symptom to be present. Neither have I succeeded in producing this in the first two cases.

Concerning the treatment it seems to appear from the literature that the cases which are diagnosed immediately after the accident and treated with confinement to bed for some weeks, have an essentially better prognosis. By violent disclocation it might be a case of reposition or osteosynthesis.

I have no doubt that the fracture is not by far so rare, as appears from the scarce literature. It is easy to understand that the fracture is misjudged, considering the difficulty in

localizing it with roentgen. However, roentgen has by and by become the actual means with which to diagnose fractures, and if it fails in a single case, it is not so strange that this case will rarely be diagnosed. It is also of importance that the patient's symptoms after the trauma are not so pronounced so that he omits seeing a doctor at once.

SUMMARY

It appears from the literature that the sacrum fracture is very rare; account has been given of 55 cases altogether. Still, it is to be doubted that it is so rare in reality, as there is rather great possibility of misjudging the diagnosis.

The author points out that roentgen examination does not render the same certitude here as in the cases of most other fractures. By frontal projection one is only able to see a transverse fracture in cases of rather considerable dislocation. However, as considerable disclocation of the fragments is rare, it is obvious that one must never be satisfied with frontal projection alone, but it is also necessary to take a profile picture. Though this gives considerably better information, the clinical examination must decide the diagnosis if a fracture has not been proved by roentgen-examination.

The clinical symptoms are chiefly pain in the sacral region radiating into the back and legs. As often as not there is dysury or pain on defecation, but nerve injuries are very rare.

The suffering person may be invalidated to a rather high degree, as there seems to be formed a painful pseudoarthrosis in untreated cases. Otherwise the prognosis seems to be good, where cure, i. e. strict confinement to bed for 4 or 5 weeks, is begun immediately after the accident.

RÉSUMÉ

Il ressort de la littérature que la fracture du sacrum est très rare. 55 cas en tout ont été rapportés. Mais il est cependant douteux qu'elle soit si rare, en réalité, car les possibilités d'erreur diagnostique sont relativement nombreuses.

L'auteur souligne que l'examen radiologique ne donne pas ici la même certitude que quand il s'agit d'autres fractures. Par la projection frontale, c'est seulement lorsqu'il y a une dislocation assez considérable que l'on peut voir une fracture transversale. Etant donné cependant qu'il est très rare de rencontrer une assez grande dislocation de la fracture du sacrum, il ne faut jamais se contenter des plaques frontales, mais il faut aussi prendre des radiographies de profil. Bien que ces dernières donnent des renseignements beaucoup meilleurs que les images frontales, il faut toutefois, dans le cas où l'on n'a pas réussi à constater l'existence d'une fracture, que l'examen clinique soit décisif en ce qui concerne l'établissement du diagnostic.

Les symptômes cliniques se manifestent principalement par des douleurs dans la région du sacrum, irradiant vers le haut, dans le dos, et vers le bas, dans les jambes. Il n'est pas rare d'observer des troubles de la vessie et des intestins, mais les troubles de la sensibilité sont extrêmement rares.

Cette maladie peut être assez fortement invalidisante, car elle semble donner lieu, dans les cas qui n'ont pas été mis en traitement, à une pseudarthrose douloureuse.

Le pronostic semble être favorable lorsque le traitement — 4 à 5 semaines de strict alitement — a été institué immédiatement après l'accident.

ZUSAMMENFASSUNG

Aus der Literatur geht hervor, dass die Sacrumfraktur sehr selten ist. Es wird im ganzen über 55 Fälle berichtet. Es ist aber sehr zweifelhaft, ob sie in Wirklichkeit so selten ist, da ziemlich grosse Möglichkeiten für eine Fehldiagnose bestehen.

Verfasser betont, dass die Röntgenuntersuchung hier nicht die gleiche Sicherheit bietet wie bei den meisten anderen Frakturen. Bei Frontalprojektion kann man nur im Falle einer recht bedeutenden Dislokation eine Querfraktur sehen. Da eine grössere Dislokation indessen selten ist, ist es klar, dass man beim Vorliegen klinischer Symptome einer Sacrumfraktur sich niemals mit einer Frontalaufnahme allein begnügen darf, sondern auch ein Profilbild aufnehmen muss. Obwohl dieses wesentlich

besser Aufschluss gibt als das Frontalbild, muss man, falls es nicht gelingt, eine Fraktur nachzuweisen, die klinische Untersuchung die Diagnose entscheiden lassen.

Die klinischen Symptome sind hauptsächlich Schmerzen in der Sacralregion, die nach oben in den Rücken und nach unten in die Beine ausstrahlen. Nicht selten finden sich Blasen- und Stuhlschwierigkeiten, Sensibilitätsstörungen aber sind sehr selten.

Das Leiden kann ziemlich stark invalidisierend wirken, da sich in unbehandelten Fällen eine schmerzhafte Pseudoarthrose zu bilden scheint.

Im übrigen scheint die Prognose gut zu sein, wenn die Behandlung, d. h. 4 bis 5 Wochen strenge Bettruhe, sofort nach dem Unglücksfalle eingeleitet wurde.

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