THE MYELOGRAPHIC APPEARANCE OF SACRAL CYSTS

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The presence of cysts within the sacral spinal canal was first described as an incidental autopsy finding by Tarlov in 1938. More recent reports indicate that these structures may be the cause of pain and neurological disturbances. Since only 16 cases were found in the medical literature, we would like to report our clinical and roentgenographic experience with 4 patients.

During a study of the filum terminale in 30 routine autopsies, Tarlov found 5 cysts attached to the posterior sacral and coccygeal nerves. During life one of these patients had exhibited signs and symptoms referable to the cyst. In 1948 he described a patient with sciatic pain who was cured by removal of a sacral cyst. Although a myelogram had not been done, he felt that it probably would have been negative since the cyst was 1 cm. distal to the origin of the nerve root from the sacral dural sheath and was not in continuity with the subarachnoid space. In a second series of 60 cadavers he found cysts in 8 cases.

In 1950 Weiford described a patient with pain in the sacral area associated with bladder incontinence. At operation, a midline cyst was disclosed arising at the tip of the dural sac in the region of the filum terminale. No communications with the subarachnoid space could be demonstrated although a myelographic examination was not performed.

The first myelographic visualization of a sacral cyst was reported by Schreiber and Haddad in 1951. In their patient a collection of Pantopaque beneath the right upper sacrum and distal to the usual termination of the dural sheath was noted at the time of the myelographic examination. There was also thinning of the bone overlying the cyst. Since then, single case reports of successful myelographic demonstrations of sacral cysts have been described by Taheri et al. and Jacobs et al. Strully and Heiser reported 5 cases including one in which the cyst was not visualized, but produced an extrinsic pressure defect on the column of contrast material.

CASE REPORTS

Case 1. W.V.T., a 38-year-old white female, had complained of low back pain at various intervals for the past 12 years. For several months, she had had severe pain in her right hip radiating down the posterior aspect of the right thigh, and calf to the lateral aspect of the foot.
Examination. Knee jerks and ankle jerks were active and equal. There were no sensory changes. Minimal to moderate pain was produced on the right side by the straight leg raising test. The pain was increased by coughing, sneezing, and straining, and was relieved by lying down. Roentgenograms of the lumbar spine revealed a spondylolisthesis of the 5th lumbar vertebra with minimal forward slipping, and enlargement of the sacral canal in the region of the 2nd sacral segment.

Lumbar myelography was performed and contrast material was seen to fill a small pocket just to the right of the midline at the level of the 2nd sacral segment which was distal to the normal termination of the dural sheath (Fig. 1). This was felt to represent an arachnoid cyst.

Operation. A laminectomy was done. On removing the bone over the right side of the sacrum a bulging cyst, about 4 cm. in diameter, was disclosed which extended below the 2nd sacral segment. It had hollowed out a cavity in the sacrum and was compressing the sacral nerve roots anteriorly. The cyst contained clear fluid plus some residual Pantopaque. It was necessary to take off most of the right half of the upper two sacral segments in order to completely uncover this cyst, which was closely adherent to some of the nerve roots. It was dissected out and traced down to a narrow neck attached to the dural sac at the emergence of the 2nd sacral root. The neck was ligated and the sac was removed. The cyst was considered to be of arachnoidal origin arising near the point of emergence of the 2nd sacral root.

Course. The patient did well postoperatively with complete relief of pain.

Case 2. K.M., a 44-year-old white male, entered the hospital with the chief complaint of back pain of 17 years' duration. Seventeen years before he had fallen from a cliff and had sustained a back injury that had necessitated confinement to bed for
1 month. Since then he had had intermittent episodes of low back pain. The pain was usually brought on by "straining," aggravated by coughing and sneezing and frequently was of such severity that he was forced to go to bed. He had been incapacitated for the past 9 months. The pain did not radiate. A myelogram done 3 months previously was said to have demonstrated a disc at the L5-S1 interspace and a second one at the L4-L5 interspace.

Examining. There was no evidence of atrophy, motor weakness or sensory changes. Straight leg raising tests produced pain only when the lower extremity was brought to a 75°-90° angle. There was some limitation of forward bending and evidence of muscle spasm. Tendon reflexes were equal and active. It was the impression of the examiner that the history suggested a ruptured intervertebral disc, but was not confirmed by the physical findings.

A lateral roentgenogram of the sacrum revealed minimal narrowing of the L5-S1 interspace. An ill-defined oval area of radiolucency, measuring 3×4 cm., was present in the body of the sacrum in the area of the 2nd and 3rd sacral segments. There were two separate collections of residual opaque material in the lower portion of the sacral canal about 2 cm. below the termination of the dural sheath (Fig. 2). The radiolucent area seemed to be divided into two sections with the radio-opaque material lying in the more distal compartment. This material seemed to be encysted since it did not move on tilting the patient in either direction. Although a communication between the cyst and the subarachnoid space must have been present at the time of the original myelogram 3 months before, we were not able to demonstrate a communication. There was slight flattening of the opaque column at the level of

![Fig. 2. Case 2. AP and lateral views of the sacrum showing the oval area of radiolucency in the midportion of the sacral body and two encysted collections of radio-opaque material. The myelogram demonstrates lack of communication of subarachnoid space with the sacral cysts. There is slight flattening of the opaque column at the level of S1 with incomplete filling and elevation of the axillary sheath.](image-url)
S1 on the left with incomplete filling and elevation of the axillary sheath (Fig. 2). These findings were thought to be consistent with the presence of two arachnoideal cysts in the lower portion of the sacrum without communication with the subarachnoid space.

Operation. It was apparent that the bone overlying the 3rd sacral segment was thinned. Removal of this bone exposed a cystic mass that extended inferiorly to the 4th sacral segment and slightly across the midline. There were many extradural veins that made dissection difficult. A second cystic mass was found which extended anteriorly beneath the dural sac up to the 1st sacral segment. Both of these cysts were attached to the 3rd sacral nerve root. The wall of the cyst seemed to be composed of arachnoid bulging out through the dural sleeve of the nerve root. The dural sleeve was so completely surrounded by this arachnoid that it was impossible to find the neck of the sac. In order to completely remove the cyst, the right 3rd sacral root had to be sacrificed. A 4×5 cm. cavity remained in the anterior part of the sacrum. At no point was the bone eroded anteriorly.

Course. The postoperative convalescence was uneventful.

Pathological Report. The gross specimen consisted of a small fragment of tissue about 1 cm. in its greatest diameter and 4 mm. in thickness. One surface was covered by relatively smooth membrane, the other was dark and hemorrhagic. Microscopic examination by Dr. David E. Smith revealed that the tissue was composed of a regular mass of fine fibrous membranes, blood, and a little adipose tissue that had no distinguishing histologic characteristics.

Case 3.* R.E.F., a 29-year-old white male, was admitted to the hospital for a hemorrhoidectomy. During the process of performing a caudal anesthesia, a cyst containing 15 cc. of fluid was discovered in the lower sacrum. Roentgenograms were taken and revealed an oval area of radiolucency in the sacrum. Injection of Pantopaque demonstrated this to be the site of a cyst (Fig. 3). No communication between the cyst cavity and the subarachnoid space could be demonstrated although the lower portion of the dural sac was displaced laterally by the cyst (Fig. 4).

Examination. There were no abnormal neurological findings and the patient was completely asymptomatic.

Operation. The sacral canal was unroofed, revealing a large cyst containing yellow fluid. A second smaller cyst containing clear colorless fluid was attached to the wall of the larger cyst but no communication was demonstrated between them. The sacral nerve roots coursed anterior and lateral to the cyst. Both cysts were completely excised.

* Courtesy of Dr. Henry G. Schwartz.
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Case 4. F. B., a 65-year-old white female, entered the hospital because of difficulty in walking of 5 months' duration. The patient, who was a known hypertensive of 5 years' duration, had experienced a sudden onset of heaviness of the left leg and partial paralysis, associated with episodes of ataxia.

Examination. Blood pressure was 200/100. She walked slowly with a wide-based gait. Neurological findings were normal except for an absent left ankle jerk.

Because of a heavy sensation in the arms a cervical myelogram was performed and found to be negative. At the time of the myelography, the lumbar and sacral areas were examined, and a sacral cyst communicating with the tip of the dural sheath was found (Fig. 5). Since this lesion did not adequately account for the patient's difficulties, it was felt to represent an incidental finding of no clinical significance and exploration was not advised.

DISCUSSION

The origin and cause of sacral cysts are obscure. Tarlov\(^9\) called them perineurial cysts because he believed they arose from a splitting of the nerve root sheath with distention of the potential space between endoneurium and perineurium to form a cyst. They usually occur at the junction of the posterior root and the dorsal ganglion. They almost always occur on the sacral or coccygeal roots, but most commonly on the 2nd and 3rd sacral roots. Tarlov\(^1\) mentioned 2 cases in which cysts were encountered at autopsy.
on the thoracic dorsal ganglia. Schreiber and Haddad\(^6\) felt that local trauma was an etiological factor and postulated a progressive sequence of nerve trauma, intraneural hemorrhage and eventual cystic degeneration. Rexed\(^8\) in an autopsy study, noted proliferation of arachnoid within the tubular dural sheaths surrounding the spinal nerves as they enter the intervertebral foramina. In certain instances, the arachnoidal proliferations invaded the interior of the root fascicles and formed tiny cyst-like cavities. He noted all gradations from a just perceptible increase of arachnoid in the dura mater surrounding the root to an intense proliferation and cyst formation. He could find no evidence of inflammation, neoplasm or degenerating nerve fibers. Most authors feel that these cysts probably should be distinguished from the extradural cysts, originally described by Elsberg, Dyke and Brewer.\(^3\) Similar cysts have been described by both Baker and Webb\(^2\) and Archer \textit{et al.}\(^1\) except that these authors called them intrasacral meningoceles. Regardless of the exact etiology, the gross and microscopic pathology of their cases was similar to ours.

The chief roentgenographic abnormality associated with this condition consists of thinning of the bone surrounding the sacral canal, usually at the 2nd, 3rd and 4th sacral segments. This can usually be demonstrated only by a lateral view of the sacrum (Figs. 2 and 3). Evidence of sacral bone erosion was present in 3 of our 4 cases. Myelography may only reveal a deformity of the lower end of the thecal sac (Fig. 4). If the cyst communicates with the subarachnoid space, it may be filled with the contrast material. This occurred in 3 of our cases and in 5 cases described in the literature.\(^6\)\(^--\)\(^8\)

The clinical significance of these cysts is difficult to evaluate. In most of the cases reviewed by Tarlov\(^11\) the cysts were associated with sciatic pain. However, 2 of our patients were asymptomatic and the cyst was an incidental finding. It may be that cysts that do not communicate with the subarachnoid space are more likely to cause symptoms and as the fluid accumulates they enlarge, become tense, and press on adjacent nerves. On the

\textbf{Fig. 5. Case 4. Sacral cyst communicating with the caudal extremity of the dural sac. This was an incidental finding in a patient with no symptoms referable to this area.}
other hand, one of the largest cysts in our series which did not communicate with the subarachnoid space occurred in an asymptomatic patient.

SUMMARY

1. The myelographic appearance of 4 patients with sacral cysts has been described.
2. Communication with the subarachnoid space permitting the cyst to be filled with contrast material was present in 3 of the 4 cases.
3. Sacral cysts may be present in asymptomatic patients or may be associated with low back pain.

REFERENCES