Remarks by Professor Munro Kerr

Many years ago I directed attention to the subject of angular pregnancy—namely, that particular variety of gestation in which the zygote becomes implanted in the angle or cornu of the uterus. The exact implantation site would appear to be either directly over the tubal opening, or, more probably, in the interstitial portion of the tube immediately external to that opening. The condition is quite distinct from the typical interstitial variety of ectopic pregnancy, for the ovum develops not *in substantia uteri* but towards the uterine cavity. The term “angular” has been employed by several writers in order to distinguish it from “interstitial” pregnancy on the one hand and “cornual” pregnancy on the other, as the latter term is often used to describe a pregnancy in a horn of a uterus bicornis.

In addition to the two cases described, I have seen four which were definitely proved examples of angular pregnancy, and a number not so typical but nevertheless suggestive of this specific abnormality. One of these four cases I described many years ago, but the story bears repetition, and is as follows:

I was asked by a medical friend to see his wife, as he feared she was threatened with an abortion. I had attended the lady at her two previous confinements—one seven and the other four years previously. When I visited her she gave me the history of a period missed. She also told me that ten days after the period was expected abdominal pain and haemorrhagic vaginal discharge appeared. The discharge was not great, but the pain was sometimes severe, and was more marked towards the left iliac fossa. Upon making a vaginal examination I discovered that the uterus was enlarged, and at the left cornu in the neighbourhood of the tube I could detect a small localized bulging. I told her husband of my fear that there might be an extrauterine pregnancy, and that I was chiefly alarmed because it was so close beside the uterus. My fear appeared to be fully justified when, two days later, a cast complete except at one corner was expelled. I thought I would have to open the abdomen at this stage, but my friend requested me to delay doing so. We were, however, prepared for any possible sudden call to operate; the patient was watched very carefully, and all discharges kept. Four days later a small piece of membrane, which just completed the sac that was expelled, came away in the vaginal discharge. Attached to this little piece of decidua was the ovum, which, unfortunately, I lost.

The two cases recorded above and the others I have encountered have all shown similar features: (1) pain; (2) lateral distension of the uterus in the region of the uterine cornu; and (3) tendency to abortion. The pain, as these recorded cases illustrate, may be very severe; indeed, in all the cases I have seen pain has been a pronounced feature. The reason for the pain can only be surmised. Round the tubal ostium there is a very abundant distribution of circular muscle fibres. Again, the blood supply is rich in that region, so that haemorrhages into the uterine wall or beneath the placenta are prone to occur. This is probably the explanation also of the tendency to abortion with this implantation. Of these six definite cases three terminated in abortion.

The outline of the uterine distension is characteristic: an elongated, distended lateral sacculation of the uterus at one cornu. Furthermore, it is very tender to pressure. In the case recapitulated the distension was no greater than the size of a walnut (examined under anaesthesia). In another case—an abortion at four months, which I removed with my fingers—I was afraid that I might perforate the uterine wall. From my experience the condition most commonly first attracts attention, as in the two cases here recorded, between the twelfth and twentieth weeks of pregnancy. It is obvious that the condition very closely simulates ectopic pregnancy,

pregnancy in a rudimentary horn, a fibromyoma undergoing degeneration, an ovarian cyst with torsion of the pedicle, appendicitis with lateral flexion of the uterus, or pyelitis complicating pregnancy.

Scattered through obstetric literature are references to angular pregnancy. Paul Bar, Howard Kelly, and I directed attention to it long years ago. Few obstetricians, however, appear to recognize the condition as a specific clinical entity. Modern textbooks, even those of considerable size, make little if any reference to it. For example, the subject is not mentioned in Williams's *Obstetrics*, and is only briefly referred to in the sixth edition of DeLee's textbook. Several examples of cornual and angular pregnancy have been described in foreign journals, but British literature appears to be singularly lacking in such references. The two cases here described and most carefully investigated by myself and my staff cannot be unique experiences. As previously stated, I have already encountered four exactly similar. Many other obstetricians must have dealt with cases of a like nature: we should feel grateful if they would furnish a summary of their observations.

ACUTE EPIDURAL SPINAL ABSCESS

BY

LEONARD ABRAHAMSON, M.D., F.R.C.P.I.

HONORARY PHYSICIAN, RICHMOND, WHITWORTH, AND HARDWICKE
HOSPITALS, DUBLIN

A. A. McCONNELL, F.R.C.S.I.

HONORARY SURGEON, RICHMOND, WHITWORTH, AND HARDWICKE
HOSPITALS, DUBLIN

AND

G. R. WILSON, L.R.C.P. AND S.I.

The epidural space lies between the dura mater and the periosteum lining the bony walls of the vertebral canal. Dandy,¹ writing in 1926, deplors the lack of anatomical description in current textbooks, and discusses the appearances of the space in a cadaver. He attaches great importance to variations in size. Absent over the cervical enlargement, and nearly so over the lumbar swelling, the epidural space becomes deepest where the spinal cord or the mass of its roots is smallest—that is, in the upper dorsal and lower lumbar sections. According to this author the space exists only on the dorsal aspect of the dura, the ventral dura being closely applied to the bones of the vertebrae and their ligaments. The experience of one of us (A. A. McC.) suggests that in the thoracic region of the cord the ventral dura is less firmly adherent than elsewhere.

Pathology

The epidural space is occupied by a loose meshwork of areolar tissue, which, by virtue of a feeble blood supply, offers a favourable site for infection. Epidural spinal abscess, known also as suppurative peripachymeningitis, and by the more generic but less accurate term “external pachymeningitis,” is an uncommon but important disease. Many of the recorded cases have been discovered at necropsy, and although there is a record by Traube as long ago as 1871 the condition occupies little or no space in the textbooks.

Dandy classifies the causes into two groups:

1. Extension from a neighbouring focus of infection—namely, boils, or anthrax of the nape of the neck; extrapleural suppuration; osteomyelitis of a rib; osteomyelitis of the vertebrae.
2. Metastatic infection from a distant source.

In a third group no primary focus can be detected. The infectious agent is most often the *Staphylococcus aureus*, though the *Staphylococcus albus* and other organisms may occasionally be found.

Owing to the looseness of the dorsal epidural space the abscess almost invariably lies posterior to the cord, except where it is secondary to disease of the vertebral bodies. For the same reason spread may occur with great rapidity. In a case described by Mixter and Smithwick² the abscess extended from the fourth cervical vertebra to the sacrum. These authors emphasize the danger of secondary meningitis in those cases in which a ventral abscess was associated with vertebral osteomyelitis: whilst present in two cases of ventral abscess it was absent in eight cases of dorsal abscess. Insistence is laid on the importance of early recognition and drainage of epidural abscess secondary to infection of vertebrae.

Compression of the spinal cord inevitably follows abscess formation, but the severity of the myelitis is out of all proportion to the amount of compression.

This is well borne out by reports of Hassin,³ and of Ayer and Viets.⁴ When examined at necropsy the cords were not badly compressed, but in section showed marked softening. To explain this finding Hassin suggests that substances from the epidural space may travel along the spinal roots. Allen and Kahn⁵ attribute cord softening to interference with blood supply.

Diagnosis

The diagnosis of epidural abscess may offer considerable difficulty. A survey of the literature reveals the fact that in most of the cases the diagnosis was either missed or was made too late for successful surgical intervention.

Dandy found that, of twenty-five collected cases, in only four subjected to operation was a diagnosis even suspected before the necropsy findings, and with the exception of one case there was no evidence to indicate that the nature of the lesion was more than roughly guessed. On the other hand, Bunch and Madden,⁶ in a later series of nineteen cases, including two of their own, report operative intervention in sixteen. In some of the reported cases a diagnosis was made of meningitis, in others of myelitis. Allen and Kahn offer as differential diagnosis: poliomyelitis, leptomeningitis, tumour of the cord, and abscess of the cord.

From the clinical aspect pain is the earliest and the most important symptom. It is severe and persistent, and is felt not only in the back, but along the distribution of nerve-roots, irradiating at times to the lower limbs. There is often a latent period, even up to several days, before motor symptoms appear. On the other hand, but rarely, paralysis may occur and reach completeness after some hours. Complaint may be made of stiffness and tenderness in the back and neck, with pain on movement. With the appearance of paralysis there is implication of the sphincters, with difficulty of micturition and defaecation. Disturbance of sensation may appear, and extend upwards. General septic symptoms vary in severity.

Roentgenological examination is not helpful, except in cases in which osteomyelitis of vertebrae has been present for some time. Lumbar puncture may show pus from the epidural abscess, or evidence of compression in the fluid from the subarachnoid space, and these help materially in diagnosis. That it is not an altogether innocuous procedure is shown by records of two cases in which it was followed by septic infection of the meninges. Careful technique should help to minimize, if not to eliminate, the risk. In cases in which neurological findings are inconclusive in regard to localization, recourse should be had to radiography following intracisternal introduction of lipiodol.

The mortality of epidural abscess in the untreated is, as far as published results go, 100 per cent. Of sixty

cases collected by us from the literature, operation was performed in thirty. Of these, twenty survived. In many cases recovery was incomplete.

Case Report

The patient, a schoolgirl aged 14 years, previously healthy, complained of vague pain in the back on July 28th, 1933. She appeared rather seedy and listless, but went about as usual. The pain increased steadily until the fifth day, when one of us (G. R. W.) was called in. The pain was described as severe, situated over both sacro-iliac joints, and radiating round the body at the level of the iliac crests. The most striking thing was the child's attitude. She was standing up and was suspending herself from the mother's shoulders. She said that this was the only position which gave relief. There was no limitation of movement, except that flexion of the neck hurt the lower part of the back. There was no tenderness over spine or pelvis. The tongue was furred. Temperature 99° F., pulse 104.

That night she complained of pain in the legs as well as in the back. The pain steadily increased, and was hardly modified by various drugs, including morphine. On the following day pain was persistent, eased somewhat by sitting in a chair. One of us (L. A.), called in consultation, suggested a diagnosis of osteomyelitis or periostitis of the spine. The next day there was complaint of pins and needles, mainly in the left leg. The day after this a second consultation was held. The patient was sitting up, and on getting back to bed for examination complained of a severe spasm of abdominal pain. Simultaneously, the lower abdominal muscles were seen to stiffen. Tendon reflexes were exaggerated in the lower limbs. Constipation was marked. A tentative diagnosis was made of epidural spinal abscess, probably secondary to an osteomyelitis. Arrangements were made for removal to a nursing home for full investigation. On the following morning, nine days after the onset of pain, numbness developed in both legs, with inability to move the right leg. Retention of urine was noted. The patient became very restless and occasionally delirious. Temperature 100.4° F., pulse 130, respirations 32. X-ray examination of the spine was negative, and, surgical treatment-being considered advisable, one of us (A. A. McC.) was called in.

At this time—the early afternoon of August 5th—the patient complained of agonizing pain in her back and round her body, just below the umbilicus. She looked anxious; breathing was rapid and shallow. Tongue coated; colour good. She had free movement of head and neck, though flexion of the latter produced pain referred to the lumbar region. Abdominal reflexes were absent, with the exception of a slight upper left reflex. Slight tenderness was felt in lower dorsal and lumbar regions, described as "different from higher up." Left leg flaccid; could move great toe, flex ankle, and make an attempt to lift the leg. Plantar stimulation caused withdrawal and marked contraction of the hamstrings; no Babinski's sign. Knee-jerk and ankle-jerk absent. Right leg powerless and flaccid; there was just the slightest movement of the great toe. Stimulation of the sole produced the same response as on the left side. In both legs the sense of position was present. Sensation was normal except over the upper part of Scarpa's triangle on the left side, which was anaesthetic to cotton-wool and to pin-prick. Anal reflex present. Kernig's sign negative. The girdle pain, just below the level of the umbilicus, suggested a localization as high as the tenth dorsal segment of the cord, as did also the presence of an upper abdominal reflex, with absence of the lower reflexes. The anaesthesia in the upper part of Scarpa's triangle suggested involvement of the second lumbar nerve root.

Operation.—Lumbar puncture was done in the recumbent position, with local anaesthesia. When the spine was flexed the patient complained of pain down both legs and all over them; no tension of fluid (30 mm. water); no change on jugular compression; fluid slightly yellow. As we could not place absolute reliance on the patient's localization of the girdle pain, and as the upper abdominal reflex was so slight, lipiodol was injected by suboccipital puncture. Avertin was administered and anaesthesia completed with ether. Radio-

grams, taken by Dr. McDonough, showed that the lipiodol was arrested at the level of the eighth dorsal vertebra. This confirmed the clinical localization, and the laminae of the eighth, ninth, and tenth dorsal vertebrae were therefore removed. Mr. A. Chance assisted. As soon as the ligamentum subflava was opened a gush of thick pus welled up, chiefly from the left side. When the dura pulsated freely the wound was drained, and partially closed. A posterior plaster case was applied. A pure culture of *Staphylococcus aureus* was grown from the pus, and a vaccine prepared.

Subsequent History.—On the day following the operation there was complete flaccid paraplegia, with total absence of response to all forms of stimulation. Sensation was unimpaired except over Scarpa's triangle on the left side. On the next day voluntary movement of the left great toe returned; stimulation of the sole produced slight movements of the toes. Painful flexor spasms occurred, chiefly in the left leg, and recurred periodically for seventeen days. Eleven days after the operation good movement was noted in the left leg at all joints. Knee-jerk and ankle-jerk present; slight ankle-clonus. Normal plantar response. No movement in right leg except slight movement of great toe. Knee-jerk and ankle-jerk exaggerated; ankle-clonus. No plantar response. Light touch present over both limbs. Sense of position of toes accurate in left foot, usually accurate in right foot. Sixteen days after the operation voluntary movement appeared in right leg, and improved from day to day, though there was no power yet to flex the hip or knee. Left leg movements were fairly good, but the patient made no attempt to move either leg unless told to do so. The temperature, which had oscillated at first between 100° and 103° F., gradually subsided in the third week, and the pulse rate, at first 120 to 130, descended to normal. The bladder condition remained unchanged. The wound looked clean, but discharged freely. The general condition improved, and toxic symptoms disappeared.

On September 3rd the patient began to pass urine at will. On October 1st the power of walking began to return. The gait was spastic. A month later she was able to walk about a quarter of a mile; gait slightly spastic; tendon-jerks slightly increased; transitory ankle-clonus. Shortly after this slight girdle pain returned at the level of the lower chest, disappearing in the erect position. This passed off following the extrusion of a spicule of bone from the sinus. Further progress was uneventful, and at the end of April, 1934, the patient is normal in every way.

Summary

We present a case of epidural spinal abscess in which recovery followed a surgical operation. The interesting features of the case were as follows:

1. The intensity of the pain, which at its height defied all drugs, including morphine.
2. The radiation of pain round the trunk.
3. The relief afforded by the adoption of an attitude which relaxed the spine.
4. The evidence of anterior root irritation, as shown by sudden stiffening of abdominal muscles.
5. The almost complete absence of anaesthesia.
6. The latent period of eight to nine days which preceded paralysis.
7. The fact that adequate drainage was secured by the removal of three laminae. Operations on a much more extensive scale are described in the literature.

Our experience with this case suggests that removal of a large number of laminae is unnecessary. This is of obvious importance in regard to operative risk.

REFERENCES

- ¹ Dandy, W.: "Pachymeningitis Externa," *Arch. of Surg.*, 1926, xiii, 477.
- ² Mixer and Smithwick: *New England Journ. Med.*, 1932, ccvii, 126.
- ³ Hassin: *Arch. Neurol. and Psychol.*, 1928, xx, 110.
- ⁴ Ayer and Viets: *Boston Med. and Surg. Journ.*, 1916, clxxv, 864.
- ⁵ Allen and Kahn: *Journ. Amer. Med. Assoc.*, 1932, xcvi, 877.
- ⁶ Bunch and Madden: *Trans. Southern Surg. Assoc.*, 1933, xlv, 535.

TETANUS IN TOY-PISTOL WOUNDS

BY

WILLIAM BROWN, M.D.

ASSISTANT SURGEON TO OUT-PATIENTS, GLASGOW ROYAL INFIRMARY

The prophylactic use of antitetanic serum has proved so useful in cases where infection is suspected that the following case, illustrating a rare mode of infection, is worthy of notice so that early treatment on prophylactic lines can be instituted and a probable catastrophe prevented.

Case Record

An otherwise healthy boy of 8 was admitted to the Glasgow Royal Infirmary on December 9th, 1933, suffering from tetanus. The following history was obtained.

On December 2nd, 1933, he was playing with a toy pistol and some blank cartridges, for which he had exchanged a magic lantern with another boy. The pistol went off unexpectedly, and he sustained a wound of his left index finger, for which he was treated at home by his mother. On December 9th, seven days later, he developed stiffness of his jaws, and the family doctor was called in. He diagnosed tetanus, and sent him into the Royal Infirmary at once.

On admission there was well-marked trismus, associated with tenseness of the neck and back. There was also slight head retraction. He could open his mouth half an inch. He had slight convulsions, associated with some degree of opisthotonos. The left index finger was seen to have a septic wound at the base.

The boy was put into a side room with the blinds drawn and antitetanic serum administered at once. His condition gradually became worse, and on the third day the left index finger was amputated. He died quite suddenly the following day.

Serum Treatment.—On admission he was given 40,000 units of antitetanic serum intramuscularly and 20,000 units intrathecally. Next day he was given 120,000 units intramuscularly and 80,000 units intrathecally. On December 11th he had 10,000 units intramuscularly, and on the 12th 12,000 units intramuscularly and 40,000 units intrathecally. On the 13th he was given 80,000 units intrathecally.

The cerebro-spinal fluid showed nothing on culture or smear. No cultures were taken from the wound on the finger either before or after amputation.

In an endeavour to discover the source of infection I obtained from the procurator-fiscal one of the two remaining cartridges. The police were unable to trace where the cartridges were bought. However, I managed to buy some of a similar make in a shop. The original cartridge and some of the bought ones I gave to Dr. Robert Cruickshank, bacteriologist to the Glasgow Royal Infirmary. Others I sent to Dr. Clark Trotter, medical officer of health for Islington, at his own request, and he had them examined by Professor James McIntosh, director of the Bland-Sutton Institute, Middlesex Hospital. Professor McIntosh reports as follows:

"The wads were made of a rough type of paper. The cultures grew staphylococci, streptococci, coliform bacilli, and diphtheroid bacilli. No *Bacilli tetani* grew."

Dr. Cruickshank reports as follows:

"None of the bullets examined bacteriologically gave a growth of *B. tetani* either by cultural methods or by pathogenicity tests, nor were there organisms of an associated nature, such as *B. sporogenes*, which would have suggested the possible presence of *B. tetani*. The organisms recovered were aerobic and spore-bearing bacteria such as might be found in dust and in the atmosphere. On physical examination of the cartridges there was no evidence of any material—for example, horse-hair felt—likely to harbour *B. tetani*."

Tetanus infection from blank cartridge wounds has not received much attention in this country, although it has been known for some time in the United States, where