

developing an obstruction. I believe that the secret is to make a large opening. I do not consider that the ileo-cecal valve has much to do with these cases. I have found in studying them, after a few operations, that this valve becomes more and more atrophied from lack of use.

COCCYGODYNIA: A NEW METHOD OF TREATMENT BY INJECTIONS OF ALCOHOL.

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J. C. Nott reported a case of "Extirpation of the Os Coccygis for Neuralgia" in a woman aged 25, in the *New Orleans Medical Journal* of May, 1844. The two distal segments of the coccyx were removed, the terminal one being carious, and cure resulted. This, I believe, is the first instance of record in which the bone was resected for pain.

Sir J. Y. Simpson, of Edinburgh, however, was the first to describe the condition as a definite entity, to which he gave the name coccygodynia (κόκκυξ, coccyx, and ὀδύνη, pain), and to report a number of cases, in an able lecture on "Coccygodynia and Diseases and Deformities of the Coccyx", published in the *Medical Times and Gazette* of July 2nd, 1859.

Strictly speaking the affection is neurological, but in practice it has been considered by some as medical and by others as surgical. Thus, being a border-line condition, it has received scant mention in the text-books, but because of the serious symptoms to which it gives rise it may well engage our earnest attention. The leading symptom is pain in the region of the coccyx. The earlier writers, notably Simpson, thought that the pain was due to traction on the coccyx by the attached muscles and ligaments. More recently several theories have been advanced as to the etiology of the pain:

First—The *neuralgic* theory, advocated by Marro, Pozzi and others, claims that there is no definite anatomical lesion, but that the initial trauma caused violent nerve irritation which persists without any anatomical changes.

Second—Gräefe holds it to be a *neuritis* and explains twelve cases in women as due to pressure of the fetal head on the terminals of the sacral plexus. This accounts for those cases only that follow labor.

Third—Theory of *injury* of the coccyx, resulting in fracture, dislocation, ankylosis or caries.

Fourth—*Symptomatic*, i.e., a referred pain of central origin due to many functional or organic diseases of the nervous system. Starr mentions its frequent occurrence in neurasthenic and anemic persons, chiefly in women, and states that in the majority of cases it is a purely hysterical symptom. He also says that it may be associated with irritable spine and occur in cases of traumatic neurosis. Strümpell mentions its presence in two individuals with tabes dorsalis. Pain about the coccyx and anus is quite common in tabes but usually occurs at intervals.

Viewed broadly, then, all cases of coccygodynia may be classed as traumatic or symptomatic, i.e., dependent upon an organic change or functional disturbance of the central nervous system. In the traumatic cases the impact may be from within the pelvic canal or external. Difficult labor is the chief example of internal violence. Instances resulting from external force are by far the commonest and usually give the history of a fall which may cause injury of the soft parts only or cause fracture, dislocation, ankylosis or caries of the coccyx, and result in neuralgia or neuritis of the coccygeal plexus of nerves. As a rule no gross lesion of the coccyx is demonstrable. The injury usually affects the periosteum only and the soft structures adjacent or attached to the bone. Repeated traumatism, as in horse-back riding, has been responsible for some cases.

Symptomatically it may occur in toxemia, hysteria, neurasthenia, irritable spine, the traumatic neuroses and tabes dorsalis, or may even be a "habit pain". Although practically limited to women, a few examples have been reported in men.

Anatomy.—A consideration of the anatomy of the coccygeal plexus of nerves and the relations of the latter to the sympathetic system will elucidate the protean disturbances of sensation occurring in coccygodynia. The nerves entering into the formation of the coccygeal plexus or the fourth and fifth sacral, except the visceral branch of the fourth anterior sacral; the coccygeus, anterior and posterior branches, and probably the inferior hemorrhoidal branch of the internal pubic.

Moreover, there are on the anterior surface of the coccyx two

ganglia which belong to the pelvic system of the sympathetic. These coccygeal ganglia are united to each other by a small nerve filament and are connected by other filaments to the last sacral ganglion of the chain which constitutes the pelvic sympathetic. (Hamant and Pigache.)

Very naturally, then, irritation of any part of a nerve plexus so intimately related to the central and the sympathetic nervous systems may give rise to the most varied symptoms. Jointly the nerves supply sensation to the integument over the coccyx, around the anus and the intervening area and innervate the levator ani, sphincter ani and coccygeus muscles, all of which are attached to the os coccyx.

All of the cases I have seen and most of those reported give a history of injury, most frequently a fall, and I am forced to the conclusion that trauma is the causal factor in the greater number of cases of coccygodynia. The only exception may be certain symptomatic cases, and even here the possibility of injury should be very carefully investigated. Why a painful condition should follow such injury is evident. The coccyx is a small bone but gives insertion to the levator ani (in part) and coccygeus muscle on its anterior surface, and the gluteus maximus (part of origin) on its posterior surface, while the sphincter ani is inserted into its tip. The sacrosciatic ligaments are also attached to it. Thus the coccyx is surrounded by dense structures, largely fibrous, which the delicate network of nerves penetrates. If these structures are bruised, an inflammatory reaction naturally results with proliferation and subsequent contraction of the new fibrous tissue and compression of the nerves.

Injury of the bone, as fracture or dislocation, in like manner causes pain. Pressure upon the nerves either by the injured bone or by the contraction of the injured soft parts produces neuralgia. If the pressure is maintained, inflammation takes place in the nerves, i.e., neuritis results, or neuritis may occur at the beginning if the primary injury is of sufficient severity.

Symptoms.—The predominant symptom is a characteristic spasmodic, aching pain in the region of the coccyx, increased by sitting or rising, and at times by defecation and urination. Consequent avoidance of stool may result in constipation. While it may be a symptom of a hysterical condition, conversely, in the writer's opinion, coccygodynia long continued will result in a general neurotic state. The pain may be localized or radiate to the perineum or bladder.

Diagnosis.—This is established by a thorough examination, both

general and local. The former embraces the spinal column to determine injuries or disease as caries, and the nervous system to exclude tabes dorsalis, hysteria, the neuroses, etc., as well as auto-toxemia. The local external examination with the patient in the Sims' posture determines the position of the coccyx, and the point of maximum tenderness, which is usually just beyond its tip. The anal canal is then examined. An anal fissure may give all the symptoms characteristic of coccygodynia as also may cryptitis or inflammation of the crypts of Morgagni. A blind internal fistula, hypertrophied anal papillæ and foreign bodies in the rectum must also be excluded, as must rectitis by proctoscopy. The well lubricated index finger is next introduced into the rectum and the coccyx grasped between it and the thumb outside. The exact position, contour, mobility and tenderness of the coccyx can thus be determined at once. If now the soft parts just distal to the tip of the coccyx are compressed between the examining fingers, the patient will complain of exquisite pain, as the diseased coccygeal plexus of nerves has been squeezed and the pathognomonic symptom elicited. In women a vaginal examination must also be made to determine the position and condition of the uterus and its adnexa, while in men the prostate, seminal vesicles and urethra are examined for abnormalities which might cause reflex pains.

The *prognosis* hitherto has been more favorable in the traumatic cases than in those of frank neuralgia or neuritis without demonstrable associated lesions. However, with the treatment proposed, the writer confidently predicts that the latter will be equally amenable to treatment.

Treatment.—The methods of treatment that have yielded varying degrees of success are legion and only serve to emphasize their unreliability. They include local applications, counter irritation, electricity in its various forms, subcutaneous division of all muscles and ligaments attached to the sides and tip of the coccyx (Simpson), and finally excision or resection of the coccyx. Removal of the coccyx, wholly or in part, was based on the erroneous idea that the pain resided in the bone rather than in the nerves, and has wisely been abandoned except in those rare cases where it is diseased or deformed. Relief seldom followed removal of the coccyx in other cases. In fact the patient suffered a trying operation and was left in a rather worse condition from a weakened pelvic floor.

The treatment proposed by the writer is an application of the principle of injection of sensory nerves with 70 to 80 per cent. alcohol, thereby causing their degeneration, as suggested by Professor

Schlösser*, of Munich, in 1907, and practised with marked success by him and his many followers, particularly in neuralgia of the tri-facial nerve.

All of my cases were of the type of neuralgia or neuritis of the coccygeal nerves, in which this method is peculiarly applicable, though I think it should be tried in all cases of coccygodynia, whatever their nature, as its application is simple and harmless. It may relieve the distressing pain even though it does not affect its cause.

The *technic* is easily carried out at the office under strict aseptic precautions. The patient, with rectum empty, assumes the left lateral (Sims') position on a firm table, with the thighs well flexed on the abdomen and the region of the coccyx is painted with tincture of iodine. An all-glass Luer or similar sterile syringe of two centimeters capacity is filled with 80 per cent. alcohol and armed with a two inch needle of fine gauge. The index finger is now inserted into the rectum and the point of maximum tenderness is determined by counter pressure with thumb outside. In my cases this has been just below the tip of the coccyx in the midline or slightly lateral to it. Maintaining the finger in the rectum to guard against its puncture and to act as a guide, the needle is now introduced through the midline directly to the painful spot. When this is reached the patient exclaims from pain that is exquisite but tolerable, and the injection of 10 to 20 minims is made slowly. The needle is withdrawn and its puncture sealed with collodion after neutralizing the iodine on the skin with alcohol. The pain from the injected alcohol lasts a few minutes only and may be followed by a dull ache for a day or two. It is conceivable, but not probable, that a single injection would work a cure in some cases. As a rule three and at the most five injections should suffice. The interval between the injections should vary from five to ten days, one week on the average, and they are to be made always at the point which is found most tender at the time of injection. A consideration of the rather broad distribution of the coccygeal plexus of nerves already stated readily explains the necessity of repeated injections.

The writer's experience is limited to the seven cases here reported, owing to the comparative rarity of the disease, but the outcome in these has been so favorable that he earnestly commends it to others for trial.

*Schlösser—"Erfahrungen in der Neuralgiebehandlung mit Alkoholeinspritzungen." Proceedings of the Congress of Internal Medicine, Wiesbaden, 1907, XXIV, p. 49-55.

Case I.—Miss F., aged 29, developed Pott's disease in her seventh year. By wearing a plaster jacket cast she was cured when fourteen years of age, but has marked spinal deformity. She fell six months before I saw her, striking the coccyx. Since then she has had pain low down on right side of back, radiating to hip, and "a feeling as if the spine were telescoping" prevents her sleeping. Pain in the coccyx gradually increased, and was the predominating symptom when she was referred to me in June, 1910. Examination showed the coccyx deviating to the left and not movable laterally. Antero-posterior motion caused pain at the sacro-coccygeal joint, and marked tenderness was elicited by compression of the soft parts between the tip of the coccyx and the anus.

As all the routine measures had been tried, it occurred to me that injections of alcohol might be beneficial. On June 23rd, 1910, 15 minims of 80 per cent. alcohol were injected by the method described above.

June 30th, pain relieved. Dull ache persists. Sleeps better. Injected 15 minims.

July 10th, repeated injection. No further pain, but dull ache occasionally which disappeared in a fortnight and she has remained well since.

Case II.—Miss S., aged 36, fell, striking the lower part of her spine three months before I saw her in October, 1911. The pain disappeared except in the region of the coccyx. She could not sit, rise or walk with comfort and had become very nervous. Examination showed a spare, neurasthenic woman, with normal genital organs. The coccyx was normal in position and mobility. The soft parts intervening between the coccyx and anus were very tender.

After five injections of 10 to 20 minims each of 80 per cent. alcohol, given at intervals of one week, all pain disappeared and her general condition improved markedly. As she has not returned to my class at the Vanderbilt Clinic, I presume that she has remained well.

Case III.—Miss R., aged fourteen years, school girl, came under my care January 11th, 1913. Six months before she fell while roller-skating, striking lower part of spine. One month later she developed pain over the coccyx, which is very severe when she sits or rises. Bowels move 3 or 4 times daily without pain. Frequent micturition. Urine normal, except that indican is in excess. She has never menstruated. Appetite voracious. Examination shows a very stout, over-developed girl with normal organs. Coccyx is normal, but pressure just beyond its tip by the finger in the rectum elicits exquisite tenderness.

Treatment: regulated the diet.

January 30th, 1913, injected 80 per cent. alcohol, 15 minims.

February 6th, pain diminished. Repeated injection.

February 13th, slight pain still present. Injected 10 minims.

February 20, pain absent till past three days. Repeated injection.

May 16th, 1914, fifteen months after the last treatment, she reported that pain had been absent since the last injection and that she felt perfectly well. Examination elicited no tenderness.

Case IV.—M. S., widow, aged 42, came under my care at the Workhouse Hospital, June 7th, 1913. Had the diseases of childhood, otherwise always well till birth of her third and last child, seven years ago. Since

then she had intractable pains in the region of the coccyx. For this all her internal organs of generation had been removed at three laparotomies. The perineum was also operated upon three times and the coccyx removed, but the pain still persisted. She now complains of severe dragging pain at lower part of sacrum and in the rectum. She also suffers from "nervous spells", in which she faints and has convulsions. She drinks alcoholics to excess, as she expresses it, "to drown her trouble".

Physical examination shows a medium-sized woman, fairly well nourished and of good intelligence. Chest and abdomen are normal. Perineum is lacerated. Area over normal site of coccyx is very sensitive, and when compressed between the finger in the rectum and thumb outside is exquisitely tender.

Proctoscopy was negative.

June 7th, 1913, injected 80 per cent. alcohol, 20 minims, in the sensitive area.

June 17th, 1913, pain diminished. Injected 20 minims.

August 19th, 1913, pain absent since last treatment. Considers herself cured.

Case V.—M. W., widow, aged 39. Had a miscarriage at 20 and was operated upon for appendicitis one year ago.

Two years before admission to my service at the Workhouse Hospital, in June, 1913, she fell, striking on the tip of her spine. Since then she had been unable to sit without pain, which was aggravated by rising. Examination showed a markedly tender point just beyond the tip of the normal coccyx.

June 13th, 1913, injected 80 per cent. alcohol, 20 minims.

July 10th, 1913, improved. Injected 15 minims.

August 19th, 1913, still some pain. Injected 20 minims.

This gave permanent relief while she remained in the institution.

As cases IV and V were inmates of the Workhouse, I am unable to give a later report.

Case VI.—E. G., aged 19, single, consulted me April 25th, 1914. She had diphtheria in childhood, but no other illness, and was strong and well nourished. Six years before visiting me she fell one story from a fire escape striking on her buttocks. Following this fall she had attacks of pain in the region of the coccyx, especially after standing or walking. Three months ago she sustained a second fall on the buttocks. Since then the pain has been markedly aggravated and is also present when she sits or attempts to rise. Her bowels are constipated, but stools are painless. Local examination shows marked tenderness over entire coccyx, especially at its tip.

Treatment: April 25th, 1914, injected 80 per cent. alcohol, 8 minims, at the most tender point.

May 4th, 1914, less pain. Injected 8 minims, just to left of tip of coccyx.

May 9th, 1914, very little pain or tenderness now. Injected 10 minims at right of tip of coccyx.

June 10th, 1914, reported freedom from pain.

Case VII.—M. B., a widow, aged 69 years, fell in December, 1912,

striking on her buttocks and tip of the spine. Thereafter she suffered pain in the coccygeal region. This pain was aggravated by motion and was present even when reclining, when she consulted me in April, 1914. At that time local examination showed the coccyx normal in position, not ankylosed but very tender, particularly along its margins and tip.

Treatment: April 20th, 1914, injected 80 per cent. alcohol, 7 minims, at tip of coccyx.

April 25th, some improvement. Injected 8 minims.

May 9th, condition about the same. Injected 10 minims at left margin of coccyx.

May 23rd, markedly improved. Pain now only when she sits or rises. Injected 15 minims just to left of tip of coccyx.

June 11th, reports feeling well since last treatment.

Recurrence has not occurred, to my knowledge, in any of my cases. The time that has elapsed since treatment has varied from four years to one month. This would seem to justify the expectation of permanent cure. However, should relapse occur a repetition of the treatment is a simple matter.

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DISCUSSION.

Dr. T. Chittenden Hill, of Boston, Massachusetts: I have nothing to add to the paper, but I would like to compliment the author on a very valuable contribution to a condition that has given us a good deal of trouble. I have had experience with five or six of these cases, and never succeeded in doing much for them. But the removal of the coccyx in my experience has been absolutely useless. The one thing that occurred to me was that, in the cases that I have seen, I have never been able to find that very tender spot that he speaks of, where he makes his injections.

Dr. Ralph W. Jackson, Fall River, Massachusetts: I should like to ask Dr. Yeomans whether the alcohol is deposited all at one point, or whether the needle is pushed ahead, or drawn back as he deposits the alcohol.

Dr. A. Bennett Cooke, of Los Angeles, California: I confess that the subject of coccygodynia has given me considerable disturbance in the past. I have been in the habit of looking on the word as one coined to express the ignorance of the man who used it, because it means simply "pain of the coccyx." I do not think that Dr. Yeomans has entirely elucidated for us the pathology underlying it. He tells us that it is traumatic in a majority of cases. That I believe to be true; but I, like Dr. Hill, think that he has made a distinct contribution to the treatment of the disease because, as Dr. Hill suggests, the removal of the coccyx will not always relieve the trouble, though it has done so a few times in my experience; but if by injection of alcohol we can destroy the sensory nerve endings of the part and thereby absolutely anesthetize, as I imagine would be the case, it seems to me a most valuable method of treatment. It is a contribution that alone would almost make this session worth while.

Dr. Jerome M. Lynch, of New York City, New York: It is remarkable that in all the fifteen years I have been at this work, I have run across very few cases—perhaps fortunately for the patient—but it seems that the method suggested by Dr. Yeomans is the rational treatment because it has proven so.

Dr. Frank C. Yeomans, of New York City, New York: In answer to Dr. Hill's query, you have to examine the parts very carefully in the manner I have stated to find where the nerves are, and must get the tissues right between your fingers to locate the most painful spot. They are painful and tender, it may be on both sides and all around the coccyx, but there is some one spot that is the worst, and that is the point to inject. Each time these patients return the tender spot may not be at the same point; it may be somewhere else. We continue treatment until the pain is relieved, always injecting at the point of maximum tenderness at each visit.

Dr. Emmett H. Terrell, of Richmond, Virginia: What is the greatest number of injections?

Dr. Yeomans: Five. One every five days to a week. Once at the dispensary they gave me denatured alcohol, 80 per cent., and the patient had a very violent reaction. The alcohol was denatured with formaldehyd. The alcohol is deposited practically all in one spot. Dr. Cooke suggested that it anesthetized the part. That is not the theory at all. It does not anesthetize the part. The crux of the theory is that the injected nerves degenerate. But I believe there usually is regeneration in time. Some of the patients were treated long since and pain has not recurred. One case received but a single injection of alcohol and had no pain after that. With careful technic there is absolutely no danger of infection, but you must have your finger in the rectum to guard against the needle going through and you should not deposit alcohol in the mucous membrane—you deposit it in the cellular tissue, where the nerves are. There is generally a dull burning pain for a couple of days after each injection.

TREATMENT OF AMEBIC DYSENTERY BY EMETINE HYDROCHLORIDE.

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Since June, 1912, when Leonard Rogers published the first report of his treatment of amebic dysentery by emetine hydrochloride, much has been contributed to the literature of this subject by investigators in different parts of the world. Among these may be mentioned Sir Charles P. Lukis, Law, Sewell, Mallannah, and Spittel, in England;