Oleogranulomata and Grease Gun Injuries

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Summary—A granulomatous response of body tissues to oils, waxes and greases may occur with both vegetable and mineral oils. Although mineral oils tend to cause a more severe and consistent response than vegetable, the latter may cause lesions when used in diagnostic procedures. Two such cases are described, and the literature is reviewed. The clinical features and treatment of grease-gun injuries of the hand and of lesions due to the use of various oils and waxes for cosmetic and therapeutic purposes are described.

In describing some oleogranulomata encountered in clinical practice I wish to consider, in addition to those resulting from mineral oils, some which are due to vegetable oil. To do so will be more comprehensive and also enable comparison to be drawn between these types. The response by the tissues to mineral oil is more consistent and usually more severe than that to vegetable oils such as arachis, almond and poppy seed, yet the latter are potentially harmful, and occasional granulomata are found in the theca following myelography, in the lungs after bronchography and in lymph nodes after lymphangiography.

The term “oleogranuloma” is employed in the context of Symmer’s (1955) definition; namely, the granulomatous response to foreign or exogenous oils, waxes or greases. Some workers (Best and Mason, 1953; Warner and Friedman, 1956) have favoured the term “lipogranuloma” but this is better reserved for lesions resulting from an alteration in body fat due to disease or trauma, e.g. traumatic fat necrosis of the breast and buttock, also Weber-Christian disease.

I give first a brief description of the two patients who first drew my attention to oleogranulomata (Webb, 1966).

Case 1.—Mrs. F.B., aged 62 years, presented in April, 1962, with a 4-year history of anal discomfort at defaecation. Some 16 years before, haemorrhoidectomy had been performed, followed by a course of injections for recurrent piles in December, 1959. Sigmoidoscopy in May, 1962, revealed a possible stricture at 12 cm. from the anal margin and some prolapsing rectal mucosa at the anus. The latter was excised and a biopsy taken from the site of stricture. The histological report showed polypoid rectal mucosa. Barium enema examination outlined a segment of sigmoid diverticulitis.

In December 1962 the patient returned with similar symptoms and on this occasion an oval lump was felt in the rectal wall above the anorectal ring. The diagnosis of rectal adenoma was suggested.

At operation (December 1962 (A.J.W.)) under anaesthesia, 5 cm. from the anal verge on the right side, a small rounded swelling was evident lying outside the rectal wall, with an intact mucosa. With the assistant pressing the lesion laterally by a finger in the rectum, an incision was made over the perianal skin and the ischiorectal fossa was entered; the swelling was easily located between the levator ani muscle and the fascia propria of the rectum. The muscle fibres were separated and an adherent fibrous cyst measuring 2.5 × 2 cm. was excised (Figs. 1 and 2).

On opening the cyst, light-yellow, oily fluid leaked out; a diagnosis of oleocyst was made. The histological report (Dr. R. Lanigan) reads: “The cystic space is lined by a thick layer of foam cells in which foreign-body giant cells are present. There is remarkably little cellular exudate, but a broad...
Approach to oleocyst through ischiorectal fossa

Her recovery and postoperative follow-up were satisfactory apart from an anal polyp which was excised in May 1963. Following this her anal symptoms were relieved.

Case 2.—Mrs. G.C., aged 62 years, presented in January 1964 with a 3-week history of rectal bleeding, alteration of bowel habit, passage of mucus, and a recent exacerbation of lumbosacral backache with sciatica. There was a strong family history of carcinoma and her general practitioner had felt a small "early carcinoma" on the anterior rectal wall. Examination revealed a nodule 1.5 x 2 cm. in diameter on the anterior rectal wall, also palpable per vaginam just below the level of the cervix. The overlying mucosa was normal. Small internal haemorrhoids were present and urgent admission for examination under anaesthetic and biopsy was arranged.

On 13 January 1964 (A.J.W.), examination confirmed the previous findings and a diagnosis of oleocyst was made. The cyst was directed forward from the rectum by the assistant and excised through a posterior vaginal wall incision. The cyst, which was locally adherent, lay in the rectovaginal septum; its wall was breached during removal and familiar dark-yellow, oily fluid leaked out. The cyst had a thick fibrous wall. The histological report (Dr. W. C. MacC. Wilson)
The patient left hospital on the third postoperative day, her postoperative follow-up was satisfactory, and the rectal bleeding, presumably from the internal haemorrhoids, has ceased with regulation of bowel habit. A barium enema examination was normal. She had never received injections for piles, but in 1955 Mr. H. R. Duval performed a Fothergill repair for a large rectocele.

The customary postoperative flavine emulsion pack was inserted into the vagina. The fluid which leaked from the cyst at operation exactly resembled flavine emulsion.

Histopathology

The histopathological features of oleogranuloma present no difficulty apart from an occasional sarcoid reaction (Warner and Friedman, 1956) where perhaps the inciting agent has largely disappeared. A granuloma is formed around and amidst small oil-containing lacunae, which vary in size. These may be lined by a distinct layer of oil containing macrophages, which can, as in Case 1 mimic an epithelioma. Giant cells are present, together with round cells and fibrosis, although the latter may vary between a thin layer and a scirrhous mass. Eventually the lesion may calcify and in so doing simulate leiomyomata, tuberculosis and echinococcus infection.

Macroscopically, a thick-walled cyst or scirrhous honeycombed mass may be found and as with granulomata from other causes local invasion and adhesion may occur and be detectable clinically. This feature may take years to mature, but a hard mass may adhere to skin and underlying muscle—and such a lesion is permanent. Droplets of oil may be transported via the lymphatics, and regional lymphadenopathy can develop. Satellite nodules in lymphatic vessels are also a feature. A malignant or perhaps tuberculous process is simulated. Clinically these physical signs are perplexing. The reports of Symmers (1955) and Nairn and Woodruff (1955) indicate that radical mutilating surgery may be undertaken on the erroneous assumption of malignancy. Abdomino-perineal resection of the rectum has been performed for an oleogranulomatous stricture. In addition, once oil lies in the tissues it may spread by gravity,
extrinsic pressure and muscle contraction, so that physical signs may increase in dimension and over a period of time. There is no spontaneous resolution.

To complete the histopathological aspect it has been possible in many reported examples to recognise the exogenous "oil" histochemically.

Rosser (1931) used differential staining with Sudan dyes, and Murray (1958) reporting a rectal oleogranuloma employed Sharlock R. Nairn and Woodruff (1955) confirmed the presence of a mineral oil by Black's method. Fluorescent techniques on frozen sections have found a place, and Bradley and Ehrgott (1951) collected the exogenous oil from the tissues and estimated its saponification value. When faced with unusually extensive and widespread oleogranulomata from vegetable oil Best and Mason (1953) confirmed the nature of the oil by spectroscopy.

In the two earlier case reports, histochemical confirmation was not available, but as with other reported instances the circumstantial evidence placed it beyond reasonable doubt that the first was due to phenol in almond oil, while the latter derived from proflavine in oil (yellow beeswax, wool fat and liquid paraffin). McKechnie (1948) found a fibrous mass occupying the gall bladder fossa in a 48 year old woman; it contained yellow vaseline.

The two reported cases demonstrate how the tissue reaction to vegetable oil is minimal compared with that due to mineral oil. Our knowledge of this difference—and it deserves considerable emphasis—came from research work performed 40 years ago. Pinkerton (1928) induced pulmonary granulomata in animals with mineral oil; vegetable oils were relatively innocuous. A further contribution was published by Rosser and Wallace (1931) showing that in dogs, monkeys and human rectal mucosa, mineral oils produced a more florid tissue reaction than olive oil and cotton-seed oil.

Symmers (1955) has discussed this degree of tissue reaction and indicated the marked individual variation. It is likely that the physical state of the oil is important, as solid waxes are less trouble than the liquid or melted form. With regard to liquid mineral oils, Moore (1948) suggested that chemical contaminants might constitute a more important irritant than the oil itself. It is known that workers handling heavy fractions of crude oil develop far more skin reactions than those exposed solely to the distilled components.

In summary, one may say that the granulomatous reaction to any oil is liable to be unpredictable but that liquid or semi-solid mineral oils are particularly potent.

**Grease Gun Injuries of the Hand**

These strange penetrating wounds were first described in 1937, but by 1961 only 18 case reports had appeared in the English literature, although the condition is known to be more common than these figures would indicate.

Campbell Reid (1966) has provided a recent review of the subject. Either from a grease gun or oil jets used for diesel servicing, oil at between 1-10,000 lb./sq. inch is injected through a small puncture wound of the palm or fingers; considerable foreign material may enter. Initially the lesion may give little discomfort and almost escape notice—there is swelling, numbness and no pain. Within a few hours pain develops, and later the skin becomes red with signs of inflammation. Severe tissue damage will result, due to three factors: ischaemia from tissue tension, chemical irritation and infection.

Closed spaces, such as the pulp, tendon sheaths and muscular compartments of the palm are particularly vulnerable and early evacuation of the oil is required. Without evacuation, skin, bone and tendon sloughing will follow, accompanied by induration and encapsulated fibrous masses. The only chance of a good return of function is early operation under a bloodless field, involving a full debridement and curettage of the oil. The fibrous flexor sheath must if necessary be opened, leaving small proximal and middle pulleys. Oil solvents such as ether have not proved of value.

Stark et al (1961) reported 18 patients; in 4, subjected to early surgery, function was preserved, in the others amputation was required.
Factitious Lesions

These factitious lesions are fascinating and many date from the early decades of this century. In 1899, Hesse and Gersuny reported on the use of melted paraffin wax for cosmetic and alleged therapeutic purposes. For instance, to abolish facial wrinkles, improve female breast form, produce testicular prostheses and prevent urinary incontinence. In the course of time, intractable oleogranulomata developed and where the intended purpose was cosmetic, the eventual result was hopelessly disfiguring.

Factitious and accidental granulomata of the male genitalia have been reported. In 1948, Quenu and Pérol reported a sixth example of penile paraffinoma resulting from subcutaneous injection of paraffin or vaseline in an attempt to increase the size of the organ. The results were disastrous and plastic reconstruction was always required. Bradley and Ehrcott (1951) described a patient who developed a penile granuloma from the prolonged application of liquid paraffin-soaked gauze to a penile sore. All these cases had regional granulomatous lymphadenopathy and satellite lymphatic nodules. In 1940, Heyerdale and Mader encountered a Russian emigre at the Mayo Clinic with a brawny induration of the left leg. Although the man was referred on account of venous oedema, the swelling was oleogranulomatous. In 1914 this patient was living in an area politically opposed to the Czar. Melted paraffin wax had been injected into the leg to produce a swelling and prevent him wearing the high military boot, thereby escaping conscription. Hesse (1925) collected 183 such cases in Leningrad and by 1936 his assistant, Vinogradov published a long-term study. Permanent induration, recurrent ulceration and elephantiasis were common and some amputations had become necessary.

'Therapeutic' Oleogranulomata

One may encounter subcutaneous and intra-muscular masses resulting from the injection of camphor in mineral oil as a cardiac stimulant for shock, particularly during the 1914-18 war. Jaerisch (1934) reported lesions in the lower limbs of a German soldier wounded on the Somme in 1916. Both thighs were swollen and indurated with cyanotic skin. Biopsies performed on suspicion of fibrosarcoma revealed an oleogranuloma. This patient had received around 100 injections of camphor in mineral oil at a French field hospital.

Bazin (1929) reported a similar case from Montreal where an oleogranuloma of thigh followed camphor in mineral oil. The use of paraffin-soaked gauze following rhinoplasty has led to extensive granulomata of the nasal cavity. Perhaps the most devastating ill effects of oil are in the abdominal cavity where, at laparotomy, oil had been instilled before closure in order to attempt to prevent post-operative adhesions. The practice was first advocated by Martin (1888) who recommended olive oil—coming into common usage following the papers of Blake (1908) and Wilkie (1910). Sir David Wilkie, as he later became, advocated vaseline oil—probably liquid paraffin. Even at this time it had been shown experimentally that olive oil induced peritoneal adhesions in rabbits, yet for 30 years the vogue continued until reports began to appear of formidable adhesions and granulomatous masses. Norris and Davison in 1934 reported 2 patients in difficulties shortly after the installation of liquid paraffin. Marshall and Forse (1952) and Bennett and Collins in the same year published clear descriptions of the sequelae. The granulomata in the peritoneum and abdominal wounds may calcify and at re-operation be associated with such dense adhesions and fibrous masses that the situation is inoperable. Because of the invasion of visceral walls, skin and muscle by the fibrosis, inoperable malignancy and sometimes tuberculosis are simulated. Also where exploration and lysis is attempted, pockets of oil may be opened and spread, with perpetuation of the granulomata and “seeding” into the abdominal wall. After multiple operative procedures, fistulae may complicate the already serious intra-abdominal state and the mortality is high.

Haemorrhoids

The injection treatment for haemorrhoids is, as Case 1 demonstrates, not entirely free from risk and the development of oleogranulomata is one complication; they appear as rectal nodules or “tumours”. The earliest reports appeared in 1929 and 1930; the mass simulated carcinoma. Paraffin oil or melted wax had been injected. Rosser (1931) found 24 cases over a period of 5 years with per-
sistent ano-rectal symptoms after phenol in almond oil; 12 had intractable strictures. Jackman and Buie (1944) reviewed 47 patients with submucous rectal nodules and found that 50% had resulted from injection therapy.

In addition, where, owing to a failure of technique the phenol in oil enters the bladder base, prostate or seminal vesicles, serious and persistent complications can result. Dickson Wright (1950) has fully described these dangers, including lipoid embolic hepatitis. I have met one patient with oleogranulomatous prostatitis following injections for piles, and symptomatic relief was nigh impossible.

Malignant change in oleogranulomata is very uncommon but has been reported in breasts subjected to melted paraffin wax injections (Krohn, 1930). Sarcoma of the buttock occurring in two young women was recorded by Goldenberg (1954). Long acting penicillin suspended in sesame oil was incriminated. This vegetable oil has under certain experimental circumstances produced malignancy in mice.

In conclusion, oleogranulomata present a rare but important clinical problem because they may mimic a malignant process. In general they are avoidable. Accidental insults such as grease gun hand must be treated completely and expeditiously if function is to be preserved. The foreign oil must be removed.

REFERENCES