building up will have to be closely watched. From March, 1958 to March, 1959 practically every soldier of Battalion A took his annual leave of one month during which time he was not given Daraprim. This does not seem to have given rise to cases of malaria, a point carefully enquired into by the unit medical officer (Table 1.).

The precise numbers of wives and children cannot be determined. No record is kept by the Army of a soldier’s family. It is assumed that he has only one wife for allowance and quartering purposes but this number is frequently exceeded. Also the number of children born is relatively large with a very high infant mortality. For these reasons no attack rates have been worked out. The figures obtained do, however, show the marked improvement obtained where Daraprim is offered to the Nigerian soldier for the protection of his family against malaria (Table 2.).

In spite of the improvement the periodicity of malaria is still present: March, 1958 and March, 1959 both having the lowest incidence. March is usually the last dry month before the rains which commence in April and continue on into September, with occasional rains up to December, after which practically no rain falls till the succeeding April.

A CASE OF PSEUDOMYXOMA PERITONEI

BY

Captain B. A. ROPER, M.A., B.M.

Royal Army Medical Corps
Assistant Physician, Royal Hospital, Chelsea.

The term pseudomyxoma peritonei was first used by Werth (1884) to describe massive accumulations of gelatin in the peritoneal cavity resulting from rupture of a pseudomucinous cystadenoma of the ovary. Fraenkel (1901) used the same expression to describe the clinical picture resulting from rupture of a cyst of the appendix. The case described here is a patient who presented with a mass of myxomatous tissue in a hernial sac and died of the condition without other disease eight years later.

CASE REPORT

Major J. A. was a retired Indian Army officer who first reported sick in 1949 aged 59. He complained of a lump in the right groin of two years’ duration, progressively enlarging. It was painless, disappeared on lying down, and was controlled by a truss. Examination showed a thin, healthy-looking man with a large reducible right indirect inguinal hernia. He was admitted to hospital and herniorrhaphy was performed. At the operation a large sac was found behind the cord, the sac contained excess peritoneal fluid and attached to the wall was a tumour, one inch in diameter, with a hyaline granular appearance. Nothing abnormal was palpated through the neck of the sac.
Microscopy of the tumour revealed an irregular collection of mucoid material lying in a loose connective tissue matrix, a small number of glands lined by columnar epithelium, a small number of spaces lined by cuboidal epithelium and a base composed of a loose connective tissue merging into a well-differentiated fibrous tissue.

A diagnosis of pseudomyxoma with no evidence of malignancy was made. After operation a barium meal and “follow through” were undertaken, but no abnormality was detected. He was observed at intervals and remained well until April, 1952, when he presented with a reducible hernia, of short duration, in the left inguinal region.

Herniorrhaphy was performed and there was found a large sac containing pellets of mucoid material with clusters of similar material on the sac wall and in the peritoneal cavity. Histology of the material was identical with that of 1949. A barium meal and “follow through” were repeated and showed multiple diverticula in the large bowel.

In November, 1953, there was a recurrence of the right inguinal hernia but the patient was well and his weight constant. Examination showed upper abdominal distension but no masses were palpable. In the right groin there was a rubbery hard mass, one inch in diameter, which was easily reducible. At this stage the patient declined further investigation and treatment.

He was next seen in November, 1957, when he complained of six months' abdominal distension and indigestion. His indigestion took the form of considerable flatulence and “heart burn” on lying down. The “heart burn” was worse at night, sufficient to keep him awake, relieved by vomiting but not by antacids. In spite of anorexia his weight had increased by one stone during the preceding three months. He was able to walk for a mile without dyspnœa.

Examination revealed a very wasted man with gross abdominal distension, the circumference at the level of the umbilicus was forty-two inches. The umbilicus was replaced by a lump, three inches in diameter, rubbery hard, lobulated and subcutaneous. The overlying skin was thin and blue in colour, like a thin-walled cyst. There was a mass of indefinite shape across the upper abdomen. Shifting dullness could not be demonstrated. Over the right external inguinal ring was a rubbery hard mass, irreducible, and without a cough impulse. A mass the size of an apple protruded from the anterior wall of the rectum above the prostate. There were no glands palpable. He had pitting edema up to the knees.

In January, 1958, a laparotomy was performed and twenty pints of jelly-like fluid were evacuated. The cæcum and ascending colon were identified. They were surrounded by a mass of colloid material making it impossible to examine the cæcum fully and the appendix could not be identified. The greater omentum was replaced by a hard mass adherent to the abdominal wall. The remainder of the intestine could not be examined due to adhesions. No therapeutic procedure was undertaken.

After operation his condition never returned to normal. The wound healed
satisfactorily but the abdominal distension returned within fourteen days of the operation. He became thinner and eventually died.

Post-mortem examination showed that the lump in the right groin was a mass of myxomatous tissue lying over the external ring; no hernia could be demonstrated. Pseudomyxomatous tissue filled the abdominal cavity apart from the viscera. These were all covered with the jelly yet none showed invasion. The orifice of the appendix in the cæcum was found, but the body could not be found in the adjacent myxomatous tissue. No other abnormalities were found, other than terminal broncho-pneumonia in the lungs. The histology was in agreement with that already described. As the appendix could not be demonstrated and appendicectomy had not been performed, it was assumed the condition arose in the appendix and had destroyed it.

COMMENT

Pseudomucin or pseudomyxoma is mucoid tissue allied to mucin but does not give the typical reaction with acetic acid. It is generally agreed that there are two sources of pseudomyxoma, from ovarian tumours and from the appendix.

Four modes of development from the ovary have been suggested:
1. As a result of overgrowth of one component of a teratoma.
2. As a result of a serous cystadenoma undergoing metaplasia.
3. As a separate tumour allied to the Brenner tumour.
4. As a derivative of Müllerian remnants.
The third is the generally accepted view.

Trotter (1910) summarised the likely modes of origin from the appendix as follows:
1. Obstruction of the appendicular lumen due to either fibrosis or carcinoma of cystic type, resulting in a mucocele which subsequently ruptures.
2. Rupture of a diverticulum.
3. Cystic degeneration in the wall of the appendix.

It was formerly thought that most cases were caused by rupture of colloid carcinomas of the appendix (Masson & Hamrick, 1930; Woodruff & McDonald, 1940), but it is more likely that these tumours were hyperplastic but benign epithelial masses.

The rarity of pseudomyxoma is explained by the rarity of the predisposing conditions. McCarthy & McGrath (1911) described only seventeen diverticula in the course of five thousand appendicectomies, while Castle (1915) found mucoceles in 0.2 per cent of thirteen thousand post-mortems. Cystic degeneration was found in 0.5 per cent of post-mortems performed by Seelig (1920). Carcinoma of the appendix is a rare condition and only eight per cent of the total are of the cystic type (Uihlen & McDonald, 1943). Out of two thousand appendices removed over the last ten years at University College Hospital there have been no diverticula, no carcinomas, and three mucoceles.

The mode of spread throughout the peritoneum is difficult to explain. All
the suggested modes of development postulate rupture of an abnormal appendix, or production of myxomatous material by the peritoneum possibly as a result of stimulation by the presence of near-by colloid. This seems an unlikely response.

In most of the cases described the myxomatous tissue has contained epithelial cells, suggesting that rupture of some hollow organ occurs scattering cells in the peritoneal cavity, producing pseudomucin but not invading the peritoneum as in the case described. Waugh & Findley (1937) described a case in which there was an infiltrating carcinoma showing a high mucus secretion, but this appears to be an exception to the rule.

In order to explain the usual involvement of the omentum, Gardham, Choyce & Randall (1928) suggested that, when the abnormal appendix ruptured, the omentum covered the region and that some cells became attached to the omentum and proceeded to live a parasitic existence.

In 1928 Naeslund did an interesting series of experiments. He tied appendixes in young rabbits and then cut them below the ligature whilst preserving the blood supply to the distal portion. In the majority of cases mucous cysts developed in the appendix and spread occurred throughout the peritoneal cavity without infiltration. These experiments suggest opening of the lumen to the peritoneum and disturbance of continuity with the rest of the gut may be of importance in the development of the condition.

Diagnosis is rarely made before laparotomy. Brennan, Fletcher & Kyle (1959) however describe two cases in which diagnosis was made provisionally in a case of abdominal distension as a result of failure to obtain fluid at paracentesis. They suggest that when a fluid thrill is present in the abdomen, failure to demonstrate shifting dullness or to withdraw fluid on paracentesis should suggest the diagnosis. In confirmation of this, shifting dullness could not be demonstrated in the case described. The diagnosis can be confirmed by peritoneoscopy (Tedeschi, Gaston & Brown, 1949). The case described did not have calcification in the right iliac fossa which Brennan et al. (1959) mention as an aid to diagnosis.

Pseudomyxoma peritonei is extremely resistant to treatment and is invariably fatal. There is little hope of success with radio-isotopes due to matting by adhesions. The ultimate cause of death is usually cachexia due to pressure and adhesions, as in this case. In the end deterioration is sudden, until then a striking feature of these cases is the contrast between the well-being of the patient and the advanced signs in the abdomen.

SUMMARY

A case of pseudomyxoma peritonei is reported. The condition first presented as an inguinal hernia in a man of fifty-nine who ultimately died aged sixty-seven of cachexia due to abdominal distension and adhesions. The aetiology and mode of spread are discussed.

It is a pleasure to thank Mr. A. J. Gardham, Senior Surgeon, University College Hospital, for his permission to describe this case and for his help in the preparation of this paper.
REFERENCES


Editorial

A NEW ARMY BLOOD SUPPLY DEPOT

The Army Blood Transfusion Service organised by Sir Lionel Whitby during the last war was the first of its kind and the model for subsequent transfusion services formed by our allies.

It was based on the Army Blood Supply Depot at Bristol and one of the most important factors to which its success was due was the responsibility of the A.B.S.D. for providing the transfusion needs not only of the Army but also of the civilian hospitals in the South West of England from where it drew most of its donors. There it was responsible for giving clinical advice and practical assistance in the treatment of civilian patients and casualties as well as for the supply of blood, dried plasma, crystalloids, grouping sera and equipment. The A.B.S.D. thus became a most important part of the blood transfusion service of the Emergency Medical Service and by reason of its extensive and in many ways unique practical experience, exerted a considerable influence upon the technical and administrative evolution of what has now become the National Blood Transfusion Service.

These circumstances provided the A.B.S.D. with continual practical work on a large scale and a stimulus for research and development essential for an efficient and progressive unit. The A.B.S.D. also provided ideal conditions for training medical officers and other ranks in all transfusion work and especially in the practical aspects of the collection, care and giving of blood and blood grouping.

In 1946 the Army Blood Supply Depot and all Base and Field Transfusion Units were disbanded and the buildings and some of the equipment of the A.B.S.D. were taken over by the South West Regional Transfusion Centre of the National Blood Transfusion Service.

In future the main responsibility for the supply of whole blood to the Army in the United Kingdom and in the event of war to theatres overseas accessible by air, would rest with the Ministry of Health and the National Blood Transfusion Service. They would also assist in the practical training of personnel and provide dried plasma and grouping sera. The Army established a