meals to avoid pain. In so far as it is an expression of inadequate blood flow in response to increased functional demands, it merits the classical description of "abdominal angina." In the majority of cases the pain is atypical in distribution and severity and is dull and poorly localized or colicky in type. Vomiting can occur and the bowel habit tends towards intermittent diarrhoea or, where fat absorption is grossly deficient, the voiding of pale bulky stools. Inadequate absorption of food, a reduction in the size of meals, and repeated vomiting all tend to produce loss of weight which may be severe and sometimes the most striking feature of the patient's condition.

Routine clinical examination is usually negative, apart from evidence of weight loss. A bruit may be audible in the presence of arterial stenosis, and the use of a stethoscope on the abdomen is a valuable aid to diagnosis. The bruit due to stenosis of the coeliac axis or superior mesenteric artery must be differentiated from that occurring in aortic bifurcation stenosis, in which there is associated reduction in the volume of the femoral pulses, from that of aortic aneurysm, which is usually but not always palpable, and from stenosis of the renal artery.

Diagnosis.—The patient may present with characteristic symptomatology, but more often the clinical picture is vague and indeterminate. Barium investigations are usually negative and failure to make the diagnosis is frequent.

Duodenal ulcer or other duodenal abnormality may be reported on barium meal and prove misleading, as duodenal ulcer and intestinal ischaemia can coexist.[10] The patient may be treated for some time by diet and antacids without relief of symptoms, and the true diagnosis becomes evident only when fatal intestinal infarction ensues.

Severe weight loss, which is a constant feature of chronic intestinal ischaemia, may suggest the presence of alimentary carcinoma, and suspicion may be increased by a positive test for faecal occult blood even when radiological demonstration of a tumour is lacking. If laparotomy is undertaken and no tumour found the surgeon may fail to appreciate that mesenteric arterial pulsation is reduced or absent.

In other patients inadequate absorption is the principal feature of the condition and loss of weight and steatorrhoea can be severe. Special investigations may show further evidence of impaired intestinal absorption.[10] Jejunal biopsy shows flattening and atrophy of the villi, and estimation of the enzyme content of the mucosa may show reduction in the sucrase, maltase, and lactase present. Glucose and lactose tolerance curves may be flattened and xylose absorption abnormal. Routine liver-function tests are usually normal, but bromsulphalein excretion can be abnormally high. Valuable time may be lost if such evidence of malabsorption is misinterpreted as adult coeliac disease or "malabsorption syndrome" or if the response to a gluten-free diet is awaited.

It must be emphasized that aortography should be undertaken when the possibility of chronic intestinal ischaemia is suspected and the patient is fit. There are undoubted complications of aortography, but these are not frequent or serious in skilled hands and the possibility of their occurrence does not contraindicate this investigation. Films taken in lateral projection will show the three visceral arteries in profile and abnormalities of the main trunks can be readily seen. The technique employed is usually the Seldinger method of percutaneous femoral catheterization, the catheter being passed upwards into the upper abdominal aorta before dye injection. Where aorto-iliac disease or tortuosity of vessels prevents the use of this technique translumbar aortography in the lateral position is undertaken.

Surgical Treatment.—When an arterial lesion associated with symptoms of chronic intestinal ischaemia has been demonstrated operation should be undertaken and revascularization of the intestinal tract performed by one of the several methods available. Full restoration of blood flow is not essential to recovery of the gut (unlike renal artery stenosis, where complete restoration of flow is obligatory), and revascularization of the superior mesenteric artery alone usually suffices, although Morris *et al.*[7] describe cases in which revascularization of more than one artery was undertaken.

At the present time preference is usually given to aorto-mesenteric bypass grafting using Dacron or saphenous vein, but effective restoration of blood flow can be achieved also by reimplantation of the superior mesenteric artery into the aorta, by lateral anastomosis of superior mesenteric artery and aorta, or, where other methods are not possible, by anastomosis of the ileo-colic artery to the right common iliac artery.

When the lesion is due to periarterial fibrosis or constriction by the median arcuate ligament, simple division of the constricting structures ensures adequate improvement in blood flow.

The prognosis after operation is good, especially in cases with simple constriction of the vessels. When atherosclerosis is the cause the prognosis depends largely on the natural history of this disease.

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TODAY'S DRUGS

With the help of expert contributors we print in this section notes on drugs in current use.

The Macrolides and Lincomycin

The macrolides are a large group of antibiotics of which three are in clinical use. Others such as carbomycin have been abandoned because of some defect, or like tylosin have been used only in livestock.

Erythromycin

This was the first macrolide discovered, and may well be considered still to be the best.

Antibacterial Activity.—The spectrum of erythromycin corresponds closely to that of penicillin: Table I compares them for a few representative species. Most bacteria may be

TABLE I.—*Minimum Inhibitory Concentrations (μg./ml.)*

Species	Penicillin	Erythromycin
Gram-positive		
Str. pyogenes	0·01	0·03
„ pneumoniae	0·02	0·03
Staph. aureus	0·02	0·12
Cl. welchii	0·1	0·8
Gram-negative		
N. gonorrhoeae	0·005	0·4
H. influenzae	1·0	1·5
S. typhi	5–20	75
Proteus mirabilis	8	250
Esch. coli	25–100	100

relied on to possess the normal degree of sensitivity, but staphylococci, as so often happens, are the exception. They can become resistant rather rapidly during treatment, and when erythromycin is much used resistant strains are commonly found. These may or may not be resistant to other macrolides as well. The effect of the antibiotic is bacteriostatic in lower concentrations but bactericidal in higher.

Pharmacology.—Three oral forms of erythromycin are available, the base (Ilotycin), which is acid-labile and has thus to be enteric-coated, the stearate (Erythrocin), and the estolate (Ilosone). This ester, actually the lauryl sulphate of the propionyl ester, is much better absorbed, producing blood levels at least half as high again as the base. Excretion is mainly in the bile, little escaping in the urine, and, since some reabsorption follows, blood levels are well maintained and the interval between doses need not be less than six hours. The usual total daily dose is 1 g., but this may be exceeded. Two preparations (glucoheptonate and lactobionate) are available for intravenous administration.

Side-effects.—Absorption is not complete, and a paradoxical effect may be produced on the intestinal flora. *Escherichia coli*, though relatively resistant, is suppressed, and *Staphylococcus aureus*, which although normally sensitive may become highly resistant, multiplies. Diarrhoea may accompany these and other changes in some patients. A more serious effect produced by the estolate only—and then only when treatment is continued for more than 7 to 10 days—is a form of hepatotoxicity manifested by liver enlargement, usually fever, a raised serum bilirubin, sometimes with jaundice, and eosinophilia. It is therefore wise to limit the course of treatment with this ester.

Clinical Indications

The close correspondence of the range of activity of erythromycin with that of penicillin means that it can often be a useful substitute when penicillin is contraindicated, because the patient is sensitive to it. Erythromycin has thus been used for acute sore throats and septic infections and for bronchial infections for which a haemolytic streptococcus or pneumococcus may be responsible. If it is given for any staphylococcal infection it may be wise to combine it with another antibiotic in order to reduce the risk of acquired bacterial resistance. Tests sometimes show that it forms a good combination with penicillin for treating *Streptococcus viridans* endocarditis. It has been recommended for various other purposes, including the treatment of diphtheria and diphtheria carriers, leptospirosis, and mycoplasma pneumonia.

Spiramycin

This antibiotic (Rovamycin) was discovered and is manufactured in France. As can be seen from Table II, it is very much less active than erythromycin against the several bacteria with which both antibiotics are most often expected to deal. Staphylococci are less often resistant to spiramycin than to erythromycin, presumably because it is less used, though a strain may be resistant to both and always is when trained to resistance to either *in vitro*.

Only preparations of the base for oral administration are available. The usual total daily dose is 2 g., but this may be increased to 4 g. Side-effects are said to be unimportant.

Distinguished workers in France have claimed good clinical results with spiramycin in various infections, and the explanation appears to be a peculiarity in its pharmacological behaviour. It attains concentrations in the kidney, spleen, lung, and liver far higher than those in the blood, though those also persist remarkably. It may well be, therefore, that the concentration maintained at a site of infection is greater than the blood level would suggest and enough to compensate for a lower degree of antibacterial activity.

TABLE II.—*Minimum Inhibitory Concentrations (μg./ml.)*

	Erythromycin	Spiramycin	Oleandomycin
Staph. aureus	0·12	2	0·5
Str. pyogenes	0·03	0·25	0·25
„ *pneumoniae* ..	0·03	0·25	0·25
„ *faecalis*	0·5	2	2

Lack of experience with this antibiotic in Britain makes it difficult to specify clinical indications for its use, but in principle they should be as for erythromycin.

Oleandomycin

This antibiotic has a similar spectrum to that of other macrolides, and a degree of activity intermediate between those of erythromycin and spiramycin against staphylococci (Table II). Staphylococci resistant to erythromycin may be sensitive to it but are perhaps more often resistant to both antibiotics where oleandomycin has been in clinical use.

It is administered orally (and may be given parenterally) in the form of the phosphate. An ester for oral administration, triacetyloleandomycin, is better absorbed but shares with erythromycin estolate the disadvantage of hepatotoxicity.

Oleandomycin appears to have no advantage over erythromycin in any property, and is inferior in antibacterial activity. It is perhaps better known as a combination with tetracycline (Sigmamycin), originally claimed to exert a synergic effect. Independent investigators failed entirely to confirm this, and the combination appears to have no advantages. It can always be claimed that two antibiotics are better than one, since if an organism is resistant to one it may be sensitive to the other; but this argument requires that each should be given in its normal dose, and that is not provided in the usual doses of this preparation.

Lincomycin

This antibiotic (Lincocin) has been much more recently discovered. Though it has a quite different structure from the macrolides it has close affinities with them in behaviour. Its range and degree of activity are very similar to those of erythromycin. Staphylococci, streptococci, and pneumococci are highly sensitive, as are some other Gram-positive species. Gram-negative species are much more resistant, and *Neisseria* and *Haemophilus* spp., so often an exception—and sensitive to erythromycin—are also resistant. Resistant strains of normally sensitive species have, as usual, been found only among staphylococci, and studies of these show clear indications of cross-resistance with erythromycin, despite the dissimilarity in structure between the two antibiotics. It might therefore be unwise to expect much from treatment with lincomycin in an infection due to an erythromycin-resistant strain.

Administration is oral in the form of the hydrochloride. Absorption is good, though not complete, and excretion is mainly renal, but much of the antibiotic remains unaccounted for owing to degradation. The usual oral dose is 250–500 mg. at six-hour intervals. Intramuscular or intravenous injections may also be given, the dose then required being rather smaller. Several authors have found that substantial concentrations are attained in bone. The only side-effect reported has been occasional diarrhoea.

The indications for lincomycin resemble those for erythromycin, particularly in its suitability as an alternative to penicillin. It has been successfully used in acute sore throats, otitis media, and pneumonia, and for various staphylococcal infections, notably osteomyelitis. It is said to be capable of eradicating foci of infection in bone, and this is attributed to the concentration attained in this tissue. Most of these findings derive from the United States, and there has not yet been enough time for users in Britain to reach firm conclusions of their own.