The duplicate appendix: Report of a case

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Duplication of an appendix is a rare entity. A case is reported in which preoperative signs and symptoms indicated acute appendicitis, but the appendix present in the normal anatomic position on the cecum was only mildly inflamed. Further exploration revealed another appendix that was retrocecal and abscessed. The importance of being alert for rare anomalies is suggested.

A well-nourished, well-developed, 16-year-old Amish girl was admitted via the emergency room to Millcreek Community Hospital on October 10, 1981, with a chief complaint of pain in the lower right quadrant of the abdomen. She reported that she began to experience mild generalized abdominal discomfort at approximately noon on October 9. At 6 p.m. that evening, the pain became more severe and migrated to the lower right quadrant, persisting to the time of admission. The patient experienced repeated episodes of nausea and vomiting, but no diarrhea.

Physical examination on admission revealed that the patient was 5 feet 2 inches tall and weighed 126 pounds. Acute tenderness was demonstrated at and slightly below McBurney's point with grade 2 rebound tenderness and rigidity of the right rectus muscle. There was no evidence of organ enlargement, intra-abdominal mass, or flank tenderness. Vaginal examination revealed an intact hymenal ring. The uterus was small and freely movable on bimanual palpation. No specific right adnexal mass could be demonstrated, but palpation again produced pain. Rectal examination indicated normal sphincter tone with no rectal mass. Tenderness was present in the right anterior quadrant. Structural examination revealed increased paravertebral tenderness and restriction of motion at L2-4 on the right.

Admission complete blood count indicated a leukocyte count of 21,100/cu. mm., with a Schilling differential count showing 82 segmented neutrophils, 2 band forms, 7 lymphocytes, 8 monocytes, and 1 eosinophil. The hemoglobin value was 14.2 grams/dl., hematocrit, 41.7 ml./dl. Midstream urinalysis revealed 10-15 leukocytes and 0 erythrocytes per high power field with no albuminuria or bacteriuria. A urine pregnancy test yielded negative results.

The admission chest x-ray was within normal limits. Abdominal survey films revealed a large volume of gas throughout the entire intestinal tract with the suggestion of an early ileus. An excessive amount of feces was demonstrated in the cecum and ascending colon.

Following abdominal preparation, the patient was taken to surgery on an emergency basis with a preoperative diagnosis of acute appendicitis. Laparotomy revealed a moderate amount of seropurulent, intraperitoneal fluid. A small (3 cm.), mildly inflamed appendix was present in normal anatomic position on the cecum, but without evidence of acute infection or other pathologic disturbance. However, further exploration demonstrated a second, larger (7 cm.), abscessed appendix firmly adherent to the cecum in retrocecal position, its base lying 2 cm. posterior to the origin of the first appendix. The mesentery of each appendix was well-defined. No Meckel's diverticulum or other abnormality was found. Dual appendectomy was performed and the wound closed without drainage. Carbenicillin therapy was initiated postoperatively.

The pathologist reported acute suppurative appendicitis and duplicate appendix.

The patient's postoperative recovery was relatively normal, in view of the amount of handling of bowel at surgery. She experienced a mild but persistent ileus which was treated with paravertebral soft tissue manipulative therapy and subsided completely by the third postoperative day. She remained afebrile throughout the remainder of the hospital stay.

Aerobic and anaerobic cultures of peritoneal fluid taken at surgery were reported as negative at 48 hours. The results of postoperative urinalyses were within normal limits.

All Auto Suture skin staples were removed from a clean, dry wound on the patient's fifth postoperative day and Steri-Strips applied. The patient was discharged in satisfactory condition with written instructions for home care. Follow-up visits in my

office confirmed an uneventful recovery.

Discussion

The anomaly of the double or duplicate appendix is very unusual, but it has been reported in various publications in the past, including JAOA.[1] Coulson[2] cited Collin's finding of this condition of 2 in 71,000 human appendix specimens. Cases of double appendix were reported in 1980,[3,4] and another case was reported in 1982.[5] The estimated total number of cases of duplicate appendix reported over the years is approximately fifty.[5]

In the case reported here it was obvious that disease existed beyond the appendix first encountered. Consider, however, the hypothetical situation of the presence of two appendixes, both acutely inflamed. If the second appendix were located in an obscure position (that is, retrocecal), it could easily be missed. The potential hazard of this second, unrecognized appendix becoming abscessed and gangrenous with subsequent rupture and peritonitis would be devastating.

In all fields of medicine, the astute physician "expects the unexpected." As surgeons, we are taught early in our training that congenital anomalies can and do exist. We must continually be aware that the rare anomaly, if unrecognized, may well be the most dangerous.

1. Willard, R.L.: Duplication of the appendix. Report of a case. JAOA 68:785-7, Apr 69

2. Coulson, W.F.: Surgical pathology. J.B. Lippincott Co., Philadelphia, 1978, vol. 1

3. Bonk, U.: Double appendix. Pathol Res Pract 167:400-1, 1980

4. Dzhioev, V.G., et al.: Duplication of the vermiform appendix. Vestn Khir 124:91-2, 1980

5. Scarff, J.E., Jr., et al.: Duplication of the vermiform appendix. New variant of a rare anomaly. South Med J 75:860-2, Jul 82

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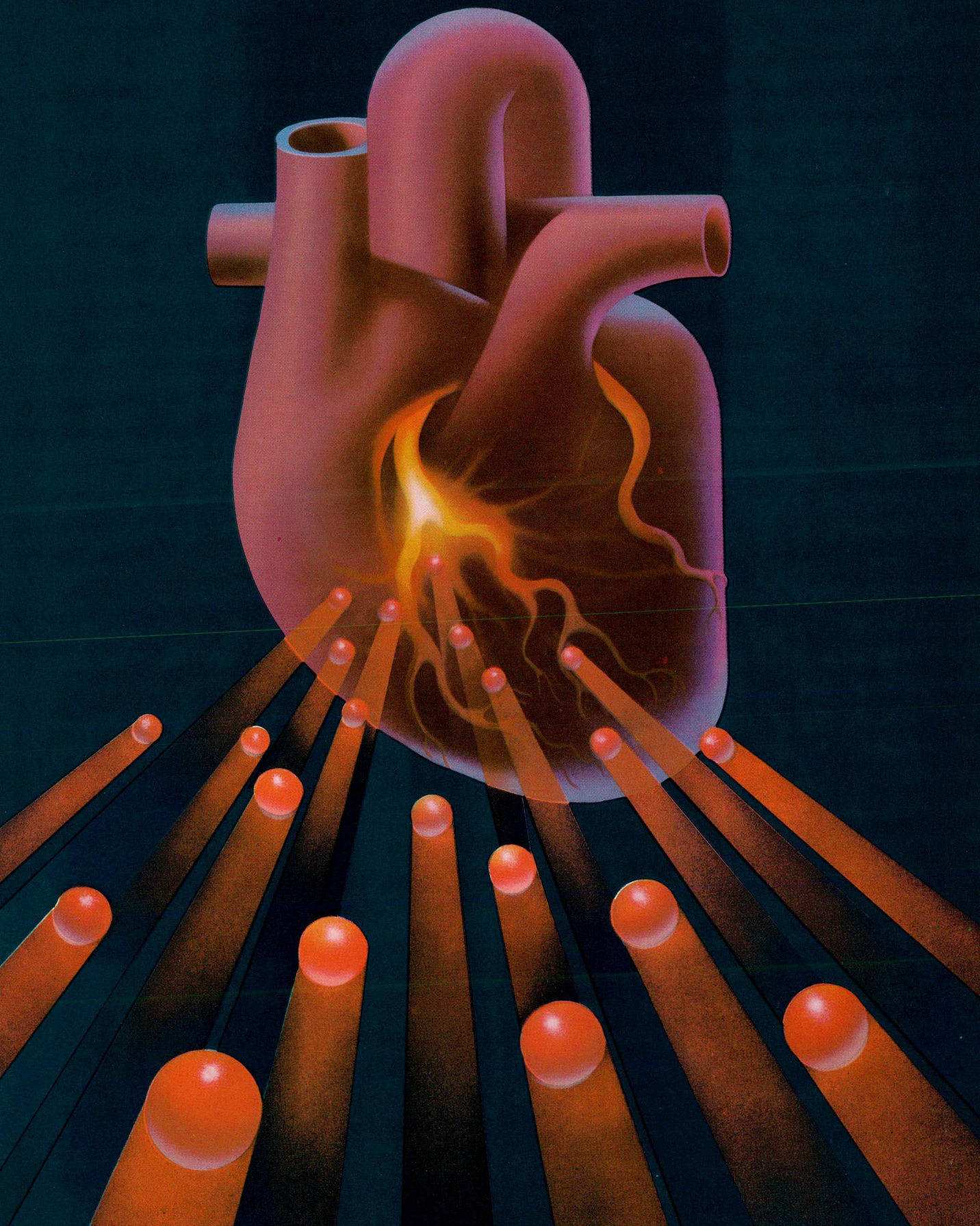

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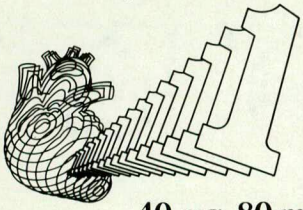

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CONTRAINDICATIONS: Bronchial asthma, sinus bradycardia and greater than first degree conduction block, cardiogenic shock, and overt cardiac failure (see WARNINGS).

WARNINGS: Cardiac Failure — Sympathetic stimulation may be a vital component supporting circulatory function in congestive heart failure, and its inhibition by beta-blockade may precipitate more severe failure. Although beta-blockers should be avoided in overt congestive heart failure, if necessary, they can be used with caution in patients with a history of failure who are well-compensated, usually with digitalis and diuretics. Beta-adrenergic blocking agents do not abolish the inotropic action of digitalis on heart muscle. IN PATIENTS WITHOUT A HISTORY OF HEART FAILURE, continued use of beta-blockers can, in some cases, lead to cardiac failure; therefore, at first sign or symptom of heart failure, digitalize and/or give diuretics, and closely observe response, or discontinue nadolol (gradually if possible).

Exacerbation of Ischemic Heart Disease Following Abrupt Withdrawal — Hypersensitivity to catecholamines has been observed in patients withdrawn from beta-blocker therapy; exacerbation of angina and, in some cases, myocardial infarction have occurred after *abrupt* discontinuation of such therapy. When discontinuing chronic use of nadolol, particularly in patients with ischemic heart disease, gradually reduce dosage over a 1- to 2-week period and carefully monitor the patient. Reinstitute nadolol promptly (at least temporarily) and take other measures appropriate for management of unstable angina if angina markedly worsens or acute coronary insufficiency develops. Warn patients not to interrupt or discontinue therapy without physician's advice. Because coronary artery disease is common and may be unrecognized, it may be prudent not to discontinue nadolol therapy abruptly even in patients treated only for hypertension.

Nonallergic Bronchospasm (e.g., chronic bronchitis, emphysema) — PATIENTS WITH BRONCHOSPASTIC DISEASES SHOULD IN GENERAL NOT RECEIVE BETA-BLOCKERS. Administer nadolol with caution since it may block bronchodilation produced by endogenous or exogenous catecholamine stimulation of $beta_2$ receptors.

Major Surgery — Because beta blockade impairs the ability of the heart to respond to reflex stimuli and may increase risks of general anesthesia and surgical procedures, resulting in protracted hypotension or low cardiac output, it has generally been suggested that such therapy should be withdrawn several days prior to surgery. Recognition of the increased sensitivity to catecholamines of patients recently withdrawn from beta-blocker therapy, however, has made this recommendation controversial. If possible, withdraw beta-blockers well before surgery takes place. In emergency surgery, inform the anesthesiologist that the patient is on beta-blocker therapy. Use of beta-receptor agonists such as isoproterenol, dopamine, dobutamine, or levarterenol can reverse the effects of nadolol. Difficulty in restarting and maintaining the heart beat has also been reported with beta-adrenergic receptor blocking agents.

Diabetes and Hypoglycemia — Beta-adrenergic blockade may prevent the appearance of premonitory signs and symptoms (e.g., tachycardia and blood pressure changes) of acute hypoglycemia. This is especially important with labile diabetics. Beta-blockade also reduces release of insulin in response to hyperglycemia; therefore, it may be necessary to adjust dose of antidiabetic drugs.

Thyrotoxicosis — Beta-adrenergic blockade may mask certain clinical signs (e.g., tachycardia) of hyperthyroidism. To avoid abrupt withdrawal of beta-adrenergic blockade which might precipitate a thyroid storm, carefully manage patients suspected of developing thyrotoxicosis.

PRECAUTIONS: Impaired Hepatic or Renal Function — Use nadolol with caution in presence of either of these conditions (see DOSAGE AND ADMINISTRATION section of package insert).

Information for Patients — Warn patients, especially those with evidence of coronary artery insufficiency, against interruption or discontinuation of nadolol without physician's advice. Although cardiac failure rarely occurs in properly selected patients, advise patients being treated with beta-adrenergic blocking agents to consult physician at first sign or symptom of impending failure.

Drug Interactions — Catecholamine-depleting drugs (e.g., reserpine) may have an additive effect when given with beta-blocking agents. When treating patients with nadolol plus a catecholamine-depleting agent, carefully observe for evidence of hypotension and/or excessive bradycardia which may produce vertigo, syncope, or postural hypotension.

Carcinogenesis, Mutagenesis, Impairment of Fertility — In 1 to 2 years' oral toxicologic studies in mice, rats, and dogs, nadolol did not produce significant toxic effects. In 2-year oral carcinogenic studies in rats and mice, nadolol did not produce neoplastic, preneoplastic, or nonneoplastic pathologic lesions.

Pregnancy — In animal reproduction studies with nadolol, evidence of embryo- a fetotoxicity was found in rabbits (but not in rats or hamsters) at doses 5 to 10 times grea (on a mg/kg basis) than maximum indicated human dose; no teratogenic potential w seen in any of these species. There are no well-controlled studies in pregnant wom therefore, use nadolol in pregnant women only if potential benefit justifies potential r to the fetus.

Nursing Mothers — It is not known whether this drug is excreted in human mi Because many drugs are excreted in human milk, exercise caution when nadolol administered to a nursing woman. Animal studies showed that nadolol is found in t milk of lactating rats.

Pediatric Use — Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: Most adverse effects have been mild and transient and ha rarely required nadolol withdrawal.

Cardiovascular — Bradycardia with heart rates of less than 60 beats per minu occurs commonly, and heart rates below 40 beats per minute and/or symptoma bradycardia were seen in about 2 of 100 patients. Symptoms of peripheral vascu insufficiency, usually of the Raynaud type, have occurred in approximately 2 of 1 patients. Cardiac failure, hypotension, and rhythm/conduction disturbances have ea occurred in about 1 of 100 patients. Single instances of first degree and third degree he block have been reported; intensification of AV block is a known effect of beta-block (see also CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS). **Central Nervo System —** Dizziness or fatigue reported in approximately 2 of 100 patients; paresthesi sedation, and change in behavior reported in approximately 6 of 1000 patien **Respiratory —** Bronchospasm reported in approximately 1 of 1000 patients (s CONTRAINDICATIONS and WARNINGS). **Gastrointestinal —** Nausea, diarrh abdominal discomfort, constipation, vomiting, indigestion, anorexia, bloating, a flatulence each reported in 1 to 5 of 1000 patients. **Miscellaneous —** Each of t following reported in 1 to 5 of 1000 patients: rash; pruritus; headache; dry mouth, eyes skin; impotence or decreased libido; facial swelling; weight gain; slurred speech; cou nasal stuffiness; sweating; tinnitus; blurred vision. Although relationship to drug usag not clear, sleep disturbances have been reported. The oculomucocutaneous syndro associated with practolol has not been reported with nadolol.

Potential Adverse Effects: Although other adverse effects reported with other be adrenergic blocking agents have not been reported with nadolol, they should considered potential adverse effects of nadolol. **Central Nervous System —** reversi mental depression progressing to catatonia; visual disturbances; hallucinations; an ac reversible syndrome characterized by disorientation for time and place; short-te memory loss, emotional lability with slightly clouded sensorium; decreased performan on neuropsychometrics. **Gastrointestinal —** mesenteric arterial thrombosis; ischer colitis. **Hematologic —** agranulocytosis; thrombocytopenic or nonthrombocytope purpura. **Allergic —** fever combined with aching and sore throat; laryngospas respiratory distress. **Miscellaneous —** reversible alopecia; Peyronie's disea erythematous rash.

OVERDOSAGE: Nadolol can be removed from the general circulation by hemodialy In addition to gastric lavage, employ the following measures as appropriate. determining duration of corrective therapy, take note of long duration of effect of nado

Excessive Bradycardia — Administer atropine (0.25 to 1.0 mg). If there is response to vagal blockade, administer isoproterenol cautiously.

Cardiac Failure — Administer a digitalis glycoside and diuretic. It has been repor that glucagon may also be useful in this situation.

Hypotension — Administer vasopressors, e.g., epinephrine or levarterenol. (Ther evidence that epinephrine may be the drug of choice.)

Bronchospasm — Administer a $beta_2$-stimulating agent and/or a theophyll derivative.

DOSAGE: For all patients, DOSAGE MUST BE INDIVIDUALIZED.

For **angina pectoris,** usual initial dose is 40 mg q.d.; gradually increase in 40 80 mg increments at 3 to 7 day intervals until optimum clinical response or pronounc slowing of the heart rate; usual maintenance dose is 80 to 240 mg q.d. (most patie respond to 160 mg or less daily). If treatment is to be discontinued, reduce dos gradually over a period of 1 to 2 weeks (see WARNINGS).

For **hypertension,** usual initial dose is 40 mg q.d.; gradually increase in 40 to 80 increments until optimum blood pressure reduction is achieved; usual maintenance d is 80 to 320 mg q.d. (rarely, doses up to 640 mg may be needed).

Patients with renal failure require adjustment in dosing interval; see package insert dosage in these patients.

For full prescribing information, consult package insert.

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