LETTERS TO THE EDITORS

Regarding "Adventitial cystic disease: a unifying hypothesis"

To the Editors:

We read with interest the review by Levien et al[1] on the pathogenesis of adventitial cystic disease. Several theories about the pathogenesis of adventitial cystic disease have been proposed in the literature, the most popular being the synovial or ganglion theory and the embryological theory. Levien et al found that all reported cases of adventitial cystic disease occurred in nonaxial vessels that are formed in the 15th to 22nd week of gestation adjacent to developing joint structures. According to the authors, the simultaneous and intimate development of both nonaxial arteries and adjacent knee, hip, wrist, or ankle joints supports the embryological hypothesis that mesenchymal tissue destined to form joints is entrapped in the nearby developing nonaxial vessels. The formation of a cystic lesion in the wall of these arteries occurs later in life, when these entrapped mesenchymal cell rests would start to secrete mucoid material.

However, there is insufficient proof for this hypothesis. Moreover, the synovial theory about the pathogenesis of adventitial cystic disease is still standing. According to this theory, cystic adventitial disease is formed by a herniation of synovium through a breach in the adjacent articulation. In this way, adventitial cystic disease represents a particular form of a synovial cyst or a ganglion cyst. Whereas a synovial cyst has a continuous synovial lining of true synovial cells, the wall composition of a ganglion cyst consists of a discontinuous layer of pseudosynovial cells. A ganglion cyst may represent an advanced stage of a degenerated synovial cyst, in which the continuous synovial lining and even the original communication with the adjacent joint may be lost during the process of degeneration.[2]

The following arguments favor the "synovial" rather than the "embryological" theory in the pathogenesis of cystic adventitial disease. First, the presence of a communication of the cyst with the adjacent joint along with a capsular branch of the affected artery is frequently found on imaging[3] and subsequently proved surgically. This has been well documented in the radiologic literature, and in our personal experience (Fig 1). This communication should be interpreted as the link between the reservoir of the underlying articulation and the protruding synovial or ganglion cyst in the wall of the adjacent artery.

Second, the onset of ischemic symptoms at middle age in most patients supports the "herniation theory." Indeed, there is no logical explanation as to what triggers the entrapped mesenchymal cell rests (according to Levien et al) in the nonaxial vessel wall to start secretion of mucoid material at middle age, and not earlier during childhood. On the contrary, internal joint derangement with joint effusion and increased intra-articular pressure occurring at older age can be considered as a logical trigger for herniation of synovial cells and intra-articular fluid through a "locus minoris resistentiae" in the joint capsule (eg, entrance of a capsular branch of the artery). Further tracking of these synovial structures along the adventitia of these capsular branches will result in cystic adventitial disease of the adjacent major vessel.

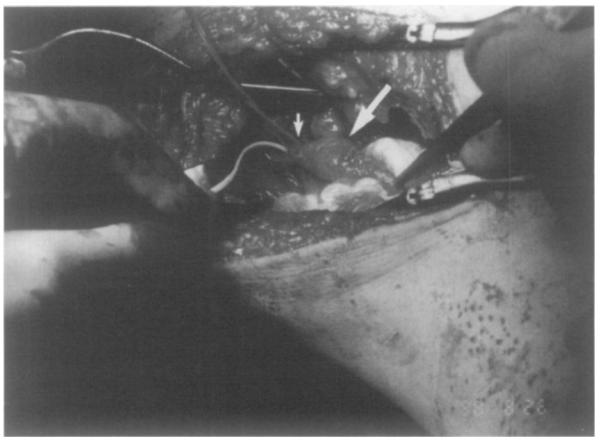

Fig 1. Intraoperative photograph demonstrating a cystic mass encasing the popliteal artery *(large arrow)*. A small arterial branch to the capsule of the knee joint arises in the adventitial cyst and is ligated by the surgeon to avoid recurrence *(small arrow)*.

Third, the fact that the histological composition of the cyst differs from normal synovium does not argue against the synovial theory. The cellular lining of the cystic wall may vary with the stage of degeneration of the cyst,[2] as it happens in other paraarticular cysts (true synovial versus ganglion cyst). The statement of the authors that histochemistery of the cyst lining has failed to provide evidence of synovial origin of the cellular lining has been denied recently.[4] The higher concentration of hyaluronic acid in these cysts, compared with synovial fluid, may be explained by the presence of a check-valve mechanism in the communicating stalk of the cyst that allows only unidirectional flow of intra-articular fluid toward the cyst. The chronic process of accumulation and resorption of intra-articular fluid in these cysts results in inspissated fluid, different from intra-articular fluid.

Furthermore, the synovial theory provides a broader explanation of the origin of all types of paraarticular cysts. It may in the same way explain the origin of perineural cystic disease (dissection of fluid along epineurium of capsular nerve branches) and of paraarticular synovial and ganglion cysts. We believe that the synovial theory is more satisfactory than the embryological theory, which only provides a possible explanation for adventitial cystic disease.

We congratulate the authors on their meticulous analysis of all cases reported in the literature. We hope that this letter may stimulate further multidisciplinary discussion.

F. M. Vanhoenacker, MD
J. E. Vandevenne, MD
A. M. De Schepper, MD, PhD

Department of Radiology
University Hospital Antwerp
Antwerp, Belgium

J. De Leersnijder, MD

Department of Vascular Surgery
A. Z. Sint-Maarten, campus Duffel
Duffel, Belgium

REFERENCES

1. Levien LJ, Benn CA. Adventitial cystic disease: a unifying hypothesis. J Vasc Surg 1998;28:193-205.
2. Vandevenne JE, Vanhoenacker F, Hauben E, De Schepper AM. Nosologie des kystes para-articulaires. In: Bard H, Drapé JL, Goutallier D, Laredo JD, editors. Le genou traumatique et dégéneratif. Montpellier: Sauramps médical; 1997. p. 293-303.
3. Malghem J, Vandeberg BC, Lebon C, Lecouvet FE, Maldague BE. Ganglion cysts of the knee: articular communication revealed by delayed radiography and CT after arthrography. AJR Am J Roentgenol 1998;170:1579-83.
4. Choschzick M, Stosiek P, Hantschick M. Cystic adventitial degeneration of the popliteal artery: rare cause of intermittent claudication in middle-aged adults. Pathologe 1997;18:467-73.

24/41/104415
doi:10.1067/mva.2000.104415

Reply

The comments of F. M. Vanhoenacker et al are noted with interest. As they correctly point out, there are several well-established theories regarding the pathogenesis of adventitial cystic disease, each with its own protagonists. They have summarized some of the evidence in favor of the synovial theory and have stressed the significance of demonstrating an anatomic communication with the relevant adjacent joint to support their argument.

However, histochemistry of the cyst lining has failed to demonstrate convincingly a synovial origin for these cells, and detailed chemical analysis of adventitial cyst fluid demonstrates gross chemical differences of many of the fluid constituents when compared with those of synovial fluid.

The correspondents have used as support of the synovial theory the age of patients presenting with this enigmatic disease, but they fail to mention that this condition has been reported in school-aged children. There must therefore remain a considerable element of doubt when considering the synovial theory.

In our publication we have drawn attention to the fact that all reported adventitial cystic disease occurs in nonaxial arteries. This does not constitute proof of the embryological theory, but simply lends support to this latter theory.

It is a dramatic experience to incise an adventitial cyst and be treated to the vision of crystal-clear fluid emerging from the vessel. The tantalizing macroscopic similarity of the adventitial cyst to a simple ganglion and the demonstration of an anatomic communication cannot constitute absolute proof of the ganglion theory. More definitive data about this curious condition are required before this argument can be laid to rest.

Lewis J. Levien, FCS, PhD

Department of Surgery
Milpark Hospital
Johannesburg, South Africa

24/41/104416
doi:10.1067/mva.2000.104416

Regarding "Randomized study of carotid angioplasty and stenting versus carotid endarterectomy: a stopped trial"

To the Editors:

Naylor and colleagues[1] report the results of a "randomized study" comparing carotid angioplasty-stenting (CAS) and carotid endarterectomy (CEA) in the management of symptomatic extracranial carotid stenosis. These investigators randomized 17 patients (10 to CEA and 7 to CAS) in a study that presumably was intended to randomize 300 patients but was terminated because of unacceptable results in the CAS group. Although we applaud the Leicester group's interest in proceeding with a clinical trial, our first observation is their apparent misunderstanding of the methodology in selecting a small sample size of only 300 patients, which we regard as inadequate to answer this question. The CREST (Carotid Revascularization Endarterectomy vs Stent Trial) investigators,[2] recently funded by a grant from the National Institute for Neurological Disorders and Stroke, National Institutes of Health, have planned for a sample size of 2500 symptomatic patients to determine clinical efficacy for these two procedures. Furthermore, the safety considerations instituted by Naylor and colleagues were unacceptable in our opinion. We seek to reassure clinicians in North America and Europe who have expressed interest in participation in CREST that no matter how skilled an interventionalist might be in the peripheral or coronary circulations, randomization of cases will *not* proceed until the interventionalist has attended a Carotid Stent Operators' Certification Program and has performed required prerandomization run-in procedures. Results will be reviewed by the Interventional Management Committee using predefined established criteria before randomization of cases can be initiated. During the performance of these cases or subsequently during the trial, one major complication (stroke or death) will result in a "watch status" for the institution, and a second major complication requires a site visit from the Surgical Management Committee, if it occurs with CEA, or from the Interventional Management Com-