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DISCUSSION

DR. HIRAM C. POLK, JR. (Louisville, Kentucky): Before getting on to the substance of this paper I would like to remind you that most of the points of technical finesse stressed for the child really do apply to the adult as well. For example, the problems of adhesions to the under surface of the mobilized left lobe of the liver is a particular problem; we do a fair number of reoperations for previous failures, and that is the first major technical problem in reoperation of these cases.

My own interest in this began some time ago, when Dr. Ravitch was kind enough to publish in the Pediatric Surgery Section of *Surgery*, when he and I were both younger, a paper that I had done based on some anecdotal experiences of Dr. Thomas Burford (*Surgery* 54:521-525, 1963). He had operated on three children with this illness over a long period of time with a standard crural repair kind of operation. We correctly identified the fact that these children get into failure to thrive and gastroesophageal reflux business, and almost never show up with symptoms that are typical of hiatal hernia and reflux esophagitis in the adult.

First of all, this has been a long-term follow-up. The 4-year follow-up shown here in a high proportion of patients speaks well for the outcome. In other words, the authors have honestly looked for their failures. Many of the good results described in this field are based on sending in your cards and letters, and never carefully looking for one's own failures.

The complication rate that is stressed here is very similar to ours, presented a few years ago before this society, in describing the misadventures with fundoplication in the adult. (*Ann Surg* 173:782, 1971). There are errors in application and technical and conceptual errors that need to be avoided if possible.

Certainly, the point of 13 out of 117 patients dying with 23 major complications is the sort of thing that gives substance to the bottom line—be careful before one undertakes this kind of operation in every child who vomits or regurgitates.

The third point that I would like to clear up is what other people call the so-called slipped-Nissen—it is the same phenomenon. Indeed, the recurrent hernia occurs usually through the plicated segment and presents identically as shown here.

I think the real question in this illness is one that was mentioned in the abstract, and was not presented, and that is: Who do you operate on, when, and how often? I think that for a time, certainly from the mid-1960s when this was first described until the mid-1970s when it was discovered by the pediatricians, the operative procedure was underdone, underutilized, and a number of children suffered because of it. Dr. Tunell has rightly put the other shoe on the foot, and said, "Now that everyone is doing it, we must carefully look at the long-

range results of this operation." I think how many patients are referred, and how many patients are refractory to medical management, of course, is absolutely essential for proper interpretation of these reports.

This will be the first of the long-term studies and will set high standards for others; all we need is a further follow-up for a longer period of time.

DR. J. ALEX HALLER, JR. (Baltimore, Maryland): One of the dilemmas that Dr. Tunell did not mention, it seems, is one that relates to the very young infant. There is increasing concern on the part of many pediatricians and pediatric surgeons that reflux is responsible for the sudden infant death syndrome, which, as you will recall, occurs usually in the first year of life.

One of the real problems that we have, and the question that I would like to direct to Dr. Tunell, is how to evaluate the child under a year of age with reflux, who may be having apneic spells and might possibly even have documented aspiration. So many of these babies reflux and, as a matter of fact, if you look at the studies of the maturation of the lower esophageal sphincter in infants up through 6 to 8 months of age, practically all normal babies reflux. A big dilemma is how to select these patients and feel confident that you are not overlooking those who may, in their next episode, die as a result of aspiration.

So I would like to ask how Dr. Tunell is managing those patients in the younger age group and what objective guidelines he is using. Is it necessary in this group of patients, and when?

DR. WILLIAM P. TUNELL (Closing discussion): A comment related to Dr. Polk's discussion: In nine of ten patients, the herniated portion of the stomach was that stomach adjacent to, but not including, that portion wrapped around the esophagus. That is, it was adjacent, mobilized fundus which had herniated through the esophageal hiatus.

Anything from vomiting to sudden infant death may be caused by gastroesophageal reflux.

The point concerning apnea made by Dr. Haller is a very real query and a very real worry in children with esophageal reflux. Children with apnea are almost always infants and, generally speaking, under 3 months of age. They were our most successful group of patients treated.

The key, was the sleep study, where the differentiation of esophageal pH—that is, episodes of reflux and episodes of apnea—are correlated during a 12- or a 24-hour study on these patients. Apnea was the only problem for which we did sleep studies, or extended pH monitoring, but these studies were instrumental in separating children with central apnea—that is, children who did not have their apnea for reasons of gastroesophageal reflux—from those who had their apnea during episodes of reflux with low esophageal pH.