The Second Stage Thoracoplasty

JAMES W. NIXON, M.D., F.C.C.P., and
JOSEPH T. GOETZ, M.D.

San Antonio, Texas

Many surgeons and patients alike share the belief that the second stage of a paravertebral thoracoplasty, in comparison with the first stage, is a simple procedure. This has not been our observation, especially in so far as the comfort of the patient is concerned. This paper is offered to compare the reactions of the patient after the second stage with those which he experienced after the first stage, and also to present certain data which we have found advantageous in improving the management of the patient before and after the second stage.

Literature concerning the first stage thoracoplasty has been ample and quite understandably has indicated that this first operation, because of its peculiar technical difficulties should be designated as the major bridge to be crossed. Consensus gives proper emphasis to the difficulty in obtaining adequate exposure in the removal of the first rib, a step that has been made immensely more simple however by severing the serratus magnus muscles as suggested by Alexander. We have reason to appreciate the importance of good exposure, since we have twice had the misfortune of injuring the subclavian vein, with the succeeding good fortune, however, of safe repair for each of the injuries. An additional difficulty which we concede as being greater in the first stage operation than in the second concerns the problem of severing the heavy rhomboid muscles. Retraction and adequate exposure are much harder to achieve, and an annoying hemorrhage which accompanies the first stage incision of these muscles is much less noticeable in the second stage procedure.

In reviewing the major difficulties of first stage thoracoplasty and in considering the length of time required for its operation, the surgeon, on first thought, might consider this stage as the one of greater proportion. But what of the patient's clinical course, in comparing the two operations? What are his reactions—and what is his mental attitude? We would rather consider this approach to the subject as the criteria upon which we base our comparison of the two operations instead of the technical surgical difficulties of the operation alone.

Over a period of twenty years, we have had ample opportunity to study the progress of the patient following each stage, and we
have concluded very definitely that in most instances the second stage is not tolerated by the patient as well as the first. Most of our complications have followed the second stage; and of significant importance is the fact that the patient complains of more pain, a situation which requires the use of more sedatives over longer periods of time. In addition, the patient notices a more pronounced loss of function of his arm, since he suffers pain in his attempts to use it. Breathing is more difficult, necessitating for relief frequent use of the oxygen tent and, in some instances, over a longer period of time than is required after the first stage. Coughing, though somewhat reduced by the earlier removal of the top ribs, is decidedly more painful, and is productive only after considerable effort on the part of the patient. Frequently, following the second stage operation, the patient will epitomize the situation by the succinct complaint, "If I could have known this would be so painful, I would never have undertaken it." A complaint rarely heard after the first stage operation.

A further appraisal of the situation reveals that wounds, following the second stage, tend to heal more slowly and have a greater tendency either to become infected or to develop a nonpurulent drainage. This handicap is explained by the presence of remaining bits of cat-gut which were not absorbed during the interval between the two stages; and further by the fact that sufficient time usually has not elapsed for the complete re-establishment of the interrupted circulation, with the result that the power of healing and of resistance to infection is lessened.

A final aspect of disadvantage concerning the second stage operation is shown in the loss of vital capacity, a hazard which is much greater than that succeeding the earlier operation, and for the obvious reason that the removal of the long rib sections now deprive a larger area of lung tissue of its previous overlying boney support. A greater degree of lung collapse must inevitably ensue. In the first stage operation, the removal of the first two or three ribs alters only slightly the vital capacity of the patient. We have concluded that we would be within the realm of safety in performing the upper stage of a thoracoplasty upon a patient with a capacity of 1,000 to 1,200 cc., but would certainly be within the realm of danger to perform the second stage with the same vital capacity. In other words, there must be neither too many ribs, nor too great a length of a few ribs removed in this operation. If a greater degree of relaxation of the lung should be required, it is far wiser to do three or four operations rather than to harass and endanger the patient with the excess difficulties that attend the crowding of the work into two stages.

Concerning management, we have found that the length of
time allowed to elapse between the first and the second stage operations is a very important factor. Formerly, it has been our custom to perform the second stage at the end of ten or twelve days. Later we extended this period to fifteen days, but more recently we have insisted that eighteen to twenty-one days must intervene before the second stage is undertaken. This increased interval makes it possible for the patient to come to the second stage in far better condition. During the last week of this intervening period the patient's appetite improves, his cough diminishes, and the freedom from pain allows him to have his much needed sleep and rest. Furthermore, we are able to have him out of bed for a few days, between stages, which circumstance has an important influence on the circulation and the general well being of the patient as well as giving an impetus to wound healing. In addition, the patient's morale invariably improves when he is permitted out-of-bed privileges. Ochsner has pointed out the importance of ambulation, both pre-operatively and post-operatively, for this type of patient.

During the interim other advantageous results can be accomplished in preparing the patient and in lessening the danger for him. We advocate early feeding, and in fact begin feeding the patient almost within twenty-four hours after the first operation. Since hypoprotonemia is frequently associated with chronic lung infections, we believe that special emphasis should be placed on a high protein diet. And because of the importance of vitamin C in wound healing, we suggest a daily dosage of 100 milligrams of ascorbic acid to be given the patient for a week prior to each operation, but this is of especial importance before the second stage.

We have found that there is rarely a need for a blood transfusion during the first two or three days of the interim period, since we routinely transfuse the first-stage patient on the operating table, giving 500 to 1,000 cc. of whole blood. Some four or five days after the operation, we give whole blood transfusions until the red blood cell count is above 4,000,000, and the hemoglobin above 70 per cent, thus assuring the patient a greater margin of safety.

Another routine which we follow is that of administering penicillin to all of our patients for two days prior to the operation, and for three days succeeding the operation also, the amount to be 20,000 units every three hours. For the comfort of the patient who may complain of disturbed sleep by the administration of dosage during the night, we have discontinued the penicillin during those hours; unless, of course, infection has already developed. In our opinion, the importance of rest in the prevention of in-
fection supersedes the advantage which might be gained by routine dosage of penicillin throughout the night.

Before closing, we should like to offer a suggestion concerning the choice of anaesthetic to be used since we believe this factor to be a highly important one in second stage thoracoplasty. For the previous operation we have found it advantageous to employ intratracheal anaesthesia, because of the difficulty encountered in obtaining relaxation of the heavy muscles attached to the scapula. However, for the second stage, we have abandoned the use of this type of anaesthesia, since fewer muscles are encountered. Instead, during the past three years we have employed sodium pentothal intravenously, supplemented with local anaesthesia of one per cent novocaine. The sodium pentothal brings about a quiet induction, and the patient, released from fear, is quickly brought to the stage of surgical anaesthesia. We find an advantage in supplementing the main anesthetic with novocaine, since the entire operating procedure can be carried out with a minimum amount of pentothal, thus lessening the likelihood of respiratory depression, a condition which would otherwise be an objectionable feature to this method of anaesthesia. In our experience, we have had only one patient who had respiratory difficulties, which trouble we attributed to the fact that three grains of nembutal had been given the patient three hours prior to the operation. As is well known, this sedative is definitely contra-indicated when sodium pentothal is used. Another advantage which ensues when this method of anaesthesia is used, concerns the amount of secretion which may accumulate in the trachea and bronchi. Not only is the amount less following the operation, but the small amount which does accumulate is coughed up easily by the patient because of quickly returning reflexes. Coughing is made easier by the reason of the fact that the paravertebral anaesthesia block lessens the pain and does not cause the patient to limit his coughing excursion. Gurd advocates spinal rather than general anaesthesia for the second stage and for the same reason that we have abandoned the general anaesthesia. Because the results we have experienced in our method have been so satisfactory, we feel justified in recommending it.

SUMMARY

The clinical reaction and the mental attitude of the patient, following the first and second stage of a paravertebral thoracoplasty, are contrasted, correcting the often accepted belief that the second stage is of less importance to the patient than the first.

From experience of twenty years it is concluded that the second stage is not tolerated as well as the first. There is a greater incl-
dence of complications. Increased pain on coughing and on use of the arm requires more sedation. Respiration is more difficult, requiring an oxygen tent for a longer period. The wound heals more slowly and exhibits a greater tendency to either become infected, or to develop a non-purulent drainage, due to remaining bits of catgut not absorbed in the interval between the two stages and, because of incomplete re-establishment of circulation. Finally, the loss of vital capacity is greater.

Measures adopted to lessen the gravity of the second stage thoracoplasty consist of the following:

1. Increasing the interval between stages from ten or twelve days to eighteen or twenty-one days. This time shows improvement in appetite, diminished cough and allows much needed sleep and rest. Ambulation for a few days has an important influence on the circulation, general well-being, and, morale of the patient.

2. Feeding early, with special emphasis given to a diet high in protein content. Blood transfusions are added as needed and vitamin C is administered.

3. Combatting infection by use of penicillin.

4. Choosing an anesthetic which lessens complications. Intravenous sodium pentothal supplemented by paravertebral block with one per cent novacaine is recommended. A quiet induction, quick return of cough reflexes, lessened secretions, and decreased pain on postoperative coughing are advantages of this method.

RESUMEN

Se comparan la reacción clínica y la actitud mental del enfermo siguientes a la primera y segunda etapas de una toracoplastía paravertebral, y se corrige la creencia, frecuentemente aceptada, de que la segunda etapa es, para el paciente, de menor importancia que la primera.

A base de la experiencia de veinte años se concluye que no se tolera la segunda etapa tan bien como la primera. Sobrevienen con mayor frecuencia las complicaciones. Se siente más dolor al toser y al mover el brazo, lo que requiere más sedantes. Es más difícil la respiración y se necesita la tienda oxigena por un período más largo. Se cicatriza más despacio la herida y manifiesta mayor tendencia a infectarse o a producir un drenaje no purulento, causado por los pedacitos de catgut que no se han absorbido en el intervalo entre las dos etapas, y debido a la incompleta restauración de la circulación. Finalmente, es mayor la pérdida en la capacidad vital.
Han sido adoptadas las siguientes medidas para disminuir la gravedad de la segunda etapa:

1. Prolongar el intervalo entre las etapas de diez o doce días a dieciocho o veintiún días. Este periodo permite que mejore el apetito y disminuya la tos, y proporcione sueño y descanso que son muy necesarios. El levantarse por unos cuantos días ejerce una importante influencia sobre la circulación, el bienestar general y el estado de ánimo del paciente.

2. Alimentar al enfermo pronto, recalando especialmente la importancia de una dieta rica en su contenido de proteínas. Se dan transfusiones de sangre cuando son necesarias y se administra vitamina C.

3. Combatir infección mediante el uso de penicilina.

4. Escoger un anestésico que disminuya las complicaciones. Se recomienda el pentatol sódico por la vía intravenosa, reforzado por bloqueo paravertebral con novocaina al uno por ciento. Las ventajas de este método son: tranquila inducción, rápida reaparición de los reflejos de la tos, disminución de secreciones y menor dolor con la tos postoperatoria.

REFERENCES

3 White, W. L. et al.: Cited by Ochsner.²
4 Gurd, of Montreal: Personal communication.