Pathogenesis of Otosclerosis

A. SINHA
H. C. SAMANT
Delhi

INTRODUCTION

Otosclerosis has been a problem for the clinicians as well as the anatomists and the pathologists. Its occurrence during the most active part of one's life, the gradually progressive course affecting both the ears, leading to a disability which puts the sufferer into much social and economic loss, have all made otosclerosis an important disease entity.

MATERIAL AND METHODS

It is now more or less generally accepted that there is some predisposing factor playing part in the development of otosclerosis, for example genetic transmission or a racial predisposition. The predisposing factors being greatly unmanageable it becomes important to continue the probe into the nature of the determining factor with all the energy and enthusiasm. The present study was conducted on sixty cases of otosclerosis selected from the patients attending E.N.T. Out-patients department and the Audiology Clinic of All India Institute of Medical Sciences, New Delhi during 1962-64. Fifty-one of these underwent surgery later and the diagnosis was confirmed at operation. Estimation of urinary neutral 17-Ketosteroids was done in 40 cases of otosclerosis. In the present article we intend to discuss the observations made on urinary excretion of neutral 17 Ketosteroids and the role of androgens as a determining factor in the pathogenesis of otosclerosis.

The method used in the estimation of neutral 17 Ketosteroids in 24 hours urine was based on Zimmermann reaction (Holtorff and Koch method). The normal range of excretion of neutral 17 Ketosteroids in urine is 4.6 mg to 17.6 mg. per 24 hours in healthy Indian males and 3.7 mg to 10 mg per 24 hours in Indian females. The observations made in cases of otosclerosis in the present series are recorded in Table No. 1.

In the males with readings below normal the range of excretion of neutral 17 Ketosteroids was 1.7 mg to
TABLE NO. 1

<table>
<thead>
<tr>
<th>No. of cases</th>
<th>No. of cases within normal range.</th>
<th>No. of cases below normal value.</th>
<th>No. of cases with low normal value.</th>
<th>No. of cases above normal value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 males</td>
<td>10 (24.5%)</td>
<td>12 (41.4%)</td>
<td>7 (24.1%)</td>
<td>Nil</td>
</tr>
<tr>
<td>11 females</td>
<td>3 (27.3%)</td>
<td>5 (42.4%)</td>
<td>1 (9.1%)</td>
<td>2 (18.2%)</td>
</tr>
<tr>
<td>Total 40</td>
<td>13 (32.5%)</td>
<td>17 (42.5%)</td>
<td>8 (20%)</td>
<td>2 (5%)</td>
</tr>
</tbody>
</table>

4.5 mg per 24 hours and in the females below normal, the range was 2.1 mg. to 3.5 mg. per 24 hours. In 7 (24.1%) of the males the values were low normal (4.6 to 7.8 mg./24 hours) while in females this was noted in 1 (9.1%) case only showing a value of 4.4 mg. 24 hours. It was seen that 25 (62.5%) out of 40 patients of otosclerosis had below normal or near low normal values of urinary excretion of total neutral 17 Ketosteroids.

DISCUSSION

The observations made in the present series have revealed that the urinary excretion of total neutral 17 Ketosteroids is decreased in majority (62.5%) of the patients of otosclerosis, (42.5% showing below normal and 20% near low normal values.)

The decrease in the excretion of total neutral 17 Ketosteroids was noted to be identical in males and females. These observations are in accordance with those of Maurer (1958) who also observed a decrease in the urinary excretion of 17 Ketosteroids in 60% of the patients of otosclerosis in his series reflecting a decreased androgen secretion.

MAURER (1958) believes that the decreased androgen secretion causes a decrease in the activity of osteoblasts resulting in a diminished alkaline phosphatase activity. This decrease in the androgen secretion and the diminished alkaline phosphatase acti-

vity in his opinion, exercises a stimulating influence on the osteoblastic system.

Arodouin (1961) emphasized the role of hormones and enzymes in the protido-phosphocalic metabolism in otosclerosis in addition to the influence of several other factors.

Frost (1960) believes that some aspects of the bone cement substance is responsible for the development of otosclerotic bone. He has described two factors in the initiation and regulation of osteoblastic activity viz. (i) the triggers which initiate the osteoblastic activity, and (ii) the rate determining modalities which regulate the rapidity and the duration of osteoblastic activity. These factors may be local or systemic or both. Frost also believes that the fibrous bone which is found in healing fractures and osteomyelitis is similar to the otosclerotic bone and that the initiating triggers and the rate determining modalities are different in the case of fibrous bone and the mature lamellar bone.

It is known that the formation of the protein matrix of bone and its mineralization are facilitated by the osteoblasts. It is also a well known fact that the androgens have a protein anabolic action and cause the retention of nitrogen, sulphur, phosphorus, potassium and water in the proportions that exist in protoplasm. They