Discussion

Gynaecomastia has occurred in workers engaged in the manufacture of stilboestrol and in a number of diseases, the most important of which are tumours of the adrenal cortex, aplasia, destructive lesions and certain tumours of the testicle, and cirrhosis of the liver. Less common causes are pituitary tumours, Albright's disease, and hyperthyroidism; the condition has also followed prostatectomy. In the absence of evidence pointing to any other of these possibilities, the case reported here is presumed to belong to the group of testicular aplasias—probably the commonest cause, anyway. Proof would depend upon testicular biopsy, which has been refused.

Gynaecomastia occurs most characteristically in the type of testicular aplasia described by Klinefelter, Riefenstein, and Albright (1942). Features of this type are aplasia of spermatogenic tissue and Sertoli cells, survival of interstitial tissue with relatively normal androgenic function, a high output of urinary gonadotrophins, and of course gynaecomastia. Heller and Nelson (1945) contrast this with the eunuchoid type in which aplasia of all testicular tissue occurs, including interstitial cells, with greatly diminished androgenic activity; the output of gonadotrophins was increased but gynaecomastia occurred much less commonly. They pointed out the existence of intermediate cases, indicating the essential relationship of the two types.

Castillo, Trabucco, and Balze (1947) reported a third type in which only spermatogenic cells were affected, Sertoli cells and interstitial cells remaining intact. Androgenic activity was relatively normal, gonadotrophin output was normal, and gynaecomastia had not been observed. They suggested that oestrogen was normally secreted by Sertoli cells, and that the high output of gonatrophins in the types with Sertoli-cell aplasia was due to the loss of the inhibitory effect of oestrogen upon the pituitary. Berthrong, Goodwin, and Scott (1949) have considered the secretion of oestrogen by Sertoli cells at some length, and have collected a good deal of evidence in favour of the hypothesis. They equate oestrogen with the "inhibin" of the older writers. So far no case intermediate between the Klinefelter and the Castillo type has been reported in the literature. The present case may well constitute a link, showing as it does gynaecomastia with relatively normal androgenic function and normal gonadotrophins. However, as testicular biopsy was refused there is no histological proof.

The physiology of mammary development is still imperfectly understood. Oestrogen and progesterone are undoubtedly important factors, but the position of the anterior pituitary is obscure. Turner (1944) and his school believe that mammary development is dependent upon two pituitary hormones, mammogen I and II; oestrogen and progesterone are thought to exert their action upon the mammary gland only through promoting the excretion of these pituitary principles. This hypothesis is not generally accepted.

The mechanism through which gynaecomastia appears in the testicular aplasias may now be considered. Overexcretion of oestrogen seems to have been excluded. Klinefelter, Riefenstein, and Albright, and Heller and Nelson found oestrogen secretion to be normal or low in all cases examined. Gynaecomastia occurs not in the type of case with intact Sertoli cells but in the types with aplasia of these cells and presumably a secretion of oestrogen lower than normal. Overproduction of anterior pituitary hormones would fit the facts better. Thus gynaecomastia occurs most commonly in the group described by Klinefelter *et al.*, in which gonadotrophin output is high, and so far has not been described in the group with normal gonado-

trophins. On the other hand, it fails to explain why gynaecomastia is much less common in the eunuchoid type and in castrates, in whom gonadotrophins again are high. The finding of more cases with normal gonadotrophins, like the one described here, would further disturb the hypothesis.

Dr. Raymond Greene suggested to me that the explanation of gynaecomastia should be sought in another direction: testicular aplasia is very likely due to a genetic disturbance. The same disturbance may in some cases also produce an increased susceptibility of the mammary tissues to normally circulating oestrogen. The idea has a good deal to recommend it.

Summary

A case of gynaecomastia is presented. Testicular aplasia is presumed. It is suggested that gynaecomastia in these cases may be due to a genetically determined over-sensitivity of the mammary tissue to normally circulating oestrogen.

My thanks are due to Mr. C. W. Hall for the photograph.

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BRACHIAL PLEXUS BLOCK

REPORT ON 350 CASES

BY

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Over a period of five years brachial plexus analgesia was administered for all operations on the upper limb when local analgesia was unsuitable. The patients were African or Bantu males aged between 18 and 65 employed on the Van Dyk Mine in the Transvaal. The operations varied from amputation through the middle of the humerus and the treatment of severe compound fractures of the upper arm and forearm to comparatively minor procedures on the fingers and hands. The cases will be divided into two series.

First Series (Various Techniques Used).—Total number of operations performed, 232. Perfect analgesia in 176, imperfect in 52, failures 4. The term "perfect" is used to indicate that no pain was felt; "imperfect" that the patient said he felt pain at some stage; and "failure" that the analgesic produced no appreciable effect. Imperfect results occurred with all analgesics used and with the six different techniques employed. The average amount injected of 1% or 2% procaine (or other analgesic of corresponding strength) was 36.5 ml. The reasons for the high percentage of imperfect results in this series were three: (1) Inexperience of the operator, who, trying different methods and analgesics, made no substantial improvement until the Macintosh and Mushin (1947) technique was employed and one drug—2% or 1% procaine, freshly prepared—was singled out for use. (2) The use of unsuitable, old, or too dilute analgesics. (3) Failure by the patients (all primitive Africans) to co-operate. The patient's co-operation is not required with the Macintosh and Mushin technique, which does not necessarily depend on subjective hyperaesthesia.

The approach for brachial plexus block by the method of Macintosh and Mushin. The patient is lying with a pillow under his shoulders and head. The shoulder on the affected side is depressed, the head is turned to the opposite side, and the muscles are relaxed. (From *Local Anaesthesia: Brachial Plexus*, by R. R. Macintosh and W. W. Mushin. By permission of the authors and Blackwell Scientific Publications.)

mentary regional or local analgesic for the completion of the operation.

Comments

The following observations are based on my experience.

1. Brachial plexus block is a very valuable, safe, and inexpensive form of analgesia which can be learned at a distance of 7,000 miles through the medium of a small book. It is particularly suitable in lean subjects, to whom my experience has been recently confined, the Bantu being a lean people.

2. Procaine in 2% concentration is a satisfactory analgesic for the average case. It produces the correct degree of analgesia quickly and consistently, though it is not so reliable in providing an effect of sufficient duration. This is borne out by the observations of Damarjian (1946). It is comparatively non-toxic, even when a single dose of 70 ml. of 2% procaine is given, as suggested by Patrick (1940). Procaine should preferably be injected with adrenaline, as recommended by Murphey (1944), because it then produces a longer effect and is less likely to cause toxic symptoms, provided that the patient is not sensitive to adrenaline and that injection into a blood vessel is avoided. The formula I used is:

Procaine hydrochlor.	..	..	87.5 gr. (5.67 g.)
Adrenaline 1-1,000	..	..	34 minims (2.04 ml.)
Phenol	..	..	9 minims (0.56 ml.)
Sterile saline to make			$\frac{1}{2}$ pint (284 ml.)

This solution is not boiled, but I have never known sepsis to follow its use. If it is desired to give 1% procaine, the above solution is simply diluted with an equal quantity of sterile saline. In 18 patients adrenaline was omitted from the injection in order to produce a quicker and shorter action. The procaine must be freshly made up. It should not be more than one week old, as it gradually loses its potency.

3. The block is as effective for extensive as for minor operations. For long operations the needle may be left *in situ* after the first injection and subsequent injections given at hourly intervals. This was done in four patients, in one of whom 140 ml. of procaine was given by repeated

Second Series (Macintosh and Mushin Technique Used).

Total number of operations performed, 118. Perfect analgesia in 113; imperfect in 4; and in one patient, classified as a failure, though perfect analgesia was obtained the operation had to be postponed owing to the toxic effects of the agent. The drug used for all but one case was procaine—2%, 1%, or a combination of the two. The four patients in whom imperfect analgesia was obtained did not, however, require any supple-

injection over a period of five hours. Ansbro (1946) has evolved a technique for such continuous analgesia. In one of my patients the plexus on both sides was blocked successfully.

4. It is preferable to avoid giving morphine until just before, or after, injecting the analgesic, or not to give it at all, so that the patient's wits are not dulled 20 minutes later when the efficacy of the analgesia has to be confirmed.

The main difficulties and dangers encountered were as follows.

Those Due to Procaine.—(a) Involuntary movement or twitching of the facial muscles, sometimes with smacking of the lips, which occurred in six patients. No treatment was given to two of them, 10 ml. of thiopentone was administered to one, 5 ml. to one, and 3 ml. to two. No ill effects resulted. (b) Nervous excitement occurred in one patient to whom 60 ml. of 2% procaine without adrenaline had been given. The condition responded to chloral and potassium bromide, but a small dose of thiopentone would probably have been more effective.

Those Due to Accidental Penetration of a Blood Vessel.—(a) Tachycardia occurred in two patients. One had been given a solution containing adrenaline, the other received no adrenaline. (b) Dizziness occurred in one patient. (c) Dyspnoea occurred in one patient: oxygen was administered, and there were no ill effects. (d) Analgesia was delayed in 11 patients: the delay was due to the formation of a haematoma.

I have had no case of pneumothorax due to penetration of the pleura or lung, but I have seen such a case demonstrated at a clinical meeting.

Summary

A report is made on 350 brachial plexus blocks, of which 118 were administered by the Macintosh and Mushin technique. This gave better results than other methods.

Reasons are suggested for the success obtained by the latter technique.

Observations are made from my experience of brachial plexus analgesia.

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The American National Society for the Prevention of Blindness has decided to increase its budget for preventive education and research to \$500,000. In his report to the annual meeting, Mr. Mason H. Bigelow, a New York lawyer, who is president of the society, said that an estimated 22,000 men, women, and children would become blind in the United States during the coming year, yet 50% to 75% of this blindness could be prevented by simply using the knowledge they already had. "In our schools, for instance, 4,500,000 children have some form of visual defect, but only a fraction of these cases are being found and treated," Mr. Bigelow said. The public must become as conscious of the significance of eye health as it was of bodily and mental health, as alive to the threat of eye accident and eye disease as it was to the threat of other health hazards. Discussing the need for much more research than is being done at present, he said that less than a million dollars a year was being spent on eye research, while over 50 times that amount was spent annually in tax funds alone for care of the blind. A survey made by the society showed that Federal agencies were spending approximately \$365,000 a year on eye research, with an additional \$550,000 spent by the nation's combined medical school and other laboratories.