RADIOGRAPHIC INVESTIGATION OF DEFECTIVE SPEECH - STILL PALATOGRAPHY

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1. INTRODUCTION

The Orthopaedic Hospital, Enugu is relatively new and its Department of Diagnostic Radiology has a history of about five and a half years.

The purpose of this paper is to present the practical aspect of the radiographic technique used for assessment of speech difficulties encountered mostly by patients with cleft palate deformities.

In the oropharynx the soft palate hangs down at rest, from the posterior edge of the hard palate. Between the soft palate and the posterior pharyngeal wall is the palatopharyngeal isthmus which connects the oropharynx with the nasopharynx. During active oral speech, the soft palate closes off this isthmus by its upward movement impinging with its lavator eminence on the contracting posterior pharyngeal wall usually just above the level of the arch of the atlas.

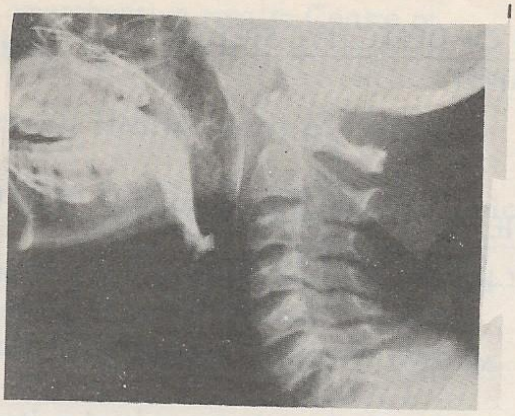
To achieve this competent sphincteric action in a normal cerebrate individual the whole palate must be intact, the soft palate mobile and of adequate length in relation to the pharyngeal cavity. Defective speech will therefore occur in a normal cerebrate person if the hard or soft palate is cleft, the soft palate paralysed or the pharynx too roomy. Of all these the commonest condition we have dealt with in our plastic Surgical Service is the cleft palate. We have used lateral X-ray palatographs now for four years to investigate velo-pharyngeal competence in these cases.

2. MATERIALS AND METHOD:

Twenty cleft palate cases were studied with their ages ranging from 4 - 13 years. 2 normal persons were included for comparison. Palatographies were done mostly postoperatively - that is after V-Y pushback repairs of the cleft palates, but a few of the older children did however have preoperative palatographs.

Radiographic Equipment for X-ray Examination of the Cleft Palate and Related Deformities:

Most of the patients examined are children and therefore require to be both physically and psychologically prepared. This involves careful handling and explanation of the people and materials the child is likely to come in contact with during the examination.



The kit required for this examination comprises the following:-

(a) A narrow rubber tube for infants e.g. endotracheal tube about 3.0mm in diameter.

(b) Cotton wool or a clean hand towel for cleaning the patent's mouth or nose as the need arises.

(c) A small container for the contrast e.g. a drinking glass or a tea cup and a table spoon.

(d) A thin mixture of Barium sulphate.

(e) A lead strip of about 5 cm long and 1.5 cm wide. The lead strip is calibrated in mm. and cm.

(f) Cut out small alphabets from lead e.g. "B, E, S, I, L. & T".

(g) Plastic strips.

(h) A 10 ml syringe.

(i) Film size: Either 10 x 8" (18x24 cm) or 12 x 10" (24x30 cm).

(j) Identification markers.

Previous Preparations:

No previous preparation is needed by the patient. The patient is asked a few minutes before the examination to remove all opaque materials e.g. necklaces, earrings and also garments around the upper thoracic and cervical regions. A child might need some assistance.

Exposure Data:

KVP	MAS	FFD	Bucky	Film	Screens	Grid
80	16	40" (102 cm)	Non-Bucky	Agfa Gevaert	Picker High speed	-

Where it is found possible magnification should be reduced to a minimum utilizing long Focus-Film-Distance of 72".

Positioning of the Patient:

The patient may be supine (as in the case of infants with horizontal X-ray beam), seated or standing in the lateral position. The sitting position has been found more comfortable since the examination lasts rather long. The patient is seated laterally in relation to the film with both feet resting on a low stool for maximum comfort. The positioning is same as in the case of the lateral view of the cervical spine but the beam is opened a little wider to include the facial bones about the level of the supraorbital line.

Centring Point:

Direct central ray at the level of the temporomandibular joints. A cone could be used where it is available.

For purposes of this article, the word surgeon will be used (with the omission of Radiologist) since all the x-ray examinations of the cleft palate done so far in the hospital as mentioned in this article have been carried out by the Plastic Surgeon and the Radiographer.

Radiographic Procedure:

(i) The exposure data is selected and after correct positioning of the patient etc. a control film is taken without contrast medium. The calibrated lead strip is then placed and fixed on the patient's lateral side of the forehead as shown on the radiographs. This helps to determine the essential measurements the Surgeon requires for his clinical interpretations and therapy as will be indicated later.

(ii) The Surgeon injects with a narrow rubber tube attached to a 10 ml syringe, 1 - 2 ml of barium into each nostril with the patient's head tipped backwards for about a minute.
He (the surgeon) sometimes instructs the patient to cough with the nostrils closed in order to have the contrast more widely distributed in the areas of interest.
The patient is then put in the correct position again by the Radiographer and a second control film is taken at rest.

(iii) Phonation "EE":

It is extremely important at this stage to explain to the patient what he or she is expected to do, what to say, how to say it and when to say it. These will help in getting the cooperation of the patient particularly in young children. The third film is then taken with the patient pronouncing the letter "EE".

(iv) Phonation "SS":

The fourth film is taken with the patient pronouncing the letter "SS". Exposures on the third and fourth films are timed to coincide as closely as possible with the "EE" & "SS" portions of the sound.

(v) Barium Swallow:

The Surgeon gives the patient a table spoonful of barium and he (the patient) is instructed not to swallow it until the command is given. The Radiographer rechecks on the positioning of the patient and gets ready at the control unit, gives the patient a commanding tone and aims at a spot film during the process of swallowing.

More Radiographs could be taken but these depend on the request of the Surgeon in charge of the case.

(vi) Use of the Lead Alphabets:

With the use of lead alphabets on the cassettes, eg. "EE, SS, STILL and B.S. (Barium Swallow)" each Radiograph can easily be identified from the other.

(vii) Radiation Protection:

All principles of radiation safety must be practised. Lead aprons and lead gloves should be used whenever the need arises. The Radiographer and plastic surgeon should stand in the most protected area available during exposure and ensure that others are out of the exposure area.

Positioning and technical exposure which might necessitate retakes should be avoided.

3. ANALYSIS OF RESULTS AND DISCUSSION:

(i) Hard Palate

The soft tissue and more distinctly the barium contrast control films show the length and level of the hard palate in relation to the arch of the atlas. We found levels varying from just below to as much as 1.5cm above the arch. (Fig.1).

(ii) Soft Palate

This is the major speech organ being assessed. The soft tissue film helps to determine its position at rest, length and thickness, while the contrast film which also coats the posterior pharyngeal wall helps us study the soft palate movements and its competence in closing off the isthmus during active speech.

While pronouncing the letters EE and SS the isthmus is closed directing the sound through the oral cavity in patients with normal speech (Figs. II). In the patient with abnormal soft palate movement the isthmus is not fully closed during similar speech (Fig.III), leaving a gap through which some air enters the nasal cavity, causing hypernasity sound distortion. Our findings showed isthmus gaps varying from 0.2 cm - 1.3 cm. Such isthmus gap measurement often helps the Surgeon decide which pharyngoplasty technique to use for therapy in each case.

(iii) Nasopharynx

The roominess of the pharynx and inclination of the posterior pharyngeal wall are observed in the control films, and the site of contrast of the soft plate levator eminence noted on the contrast speech film. Active pharyngeal wall movement necessary for achieving competent velo-pharyngeal closure in speech is observed in the barium swallow films especially if a passavant ridge appears. (Fig.IV) We observed no excessively roomy pharynx in all our cases.

4. CONCLUSION:

Still Palatography is now a well established radiographic technique for evaluating speech defects due to palatal or pharyngeal causes. When available, cine palatography will provide added information regarding swiftness of soft palate movements and clearer impression of pharyngeal wall contraction. The technique is fairly simple, does not require any more elaborate equipment than the standard X-ray machine available in many general hospitals in this country. It only requires an interested competent Radiographer who will quickly acquire the intricacies with little more training either here in Enugu or of course overseas.

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BIOLOGICAL IMPLICATIONS OF NATIONAL NUCLEAR POTENTIAL

By

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As far back as 1947, radiactivity was identified with Tin Mine industry in Plateau State of Nigeria by the Geological and Survey Division of the United Kingdom Atomic Energy Commission. The presence of Uranium and Thorium were confirmed as principal sources of radiactivity. Following this discovery, a 'Radiation Protection Panel' was set up in 1958 by the Federal Government to advise it on their biological implications, under the auspices of the Federal Ministry of Health. Subsequently, Nigeria took up membership of International Atomic Energy Agency.

Presently Nigeria is a possible exporter of Thorium. As though this does not hold enough potential for nuclear capability, the great growth in Nigeria industrial and technological development brings to focus the inadequacies of the conventional sources of energy, namely fossil fuel energy and Hydroenergy. The third possible source of energy - solar energy has been suggested as a possible source of power supply to augument the services of NEPA.

However, experts suggest that this is not only economically too much a drain on our gross national product (GNP) but also we lack the technological sophistication it demands. We are therefore left with one alternative, namely nuclear energy. Recently the Federal Military Government endorsed this forecast. Nigeria is therefore geared for a take off of Nuclear or Atomic Industry. The products of the