

GENERAL STAFF MEETING  
UNIVERSITY HOSPITALS  
UNIVERSITY OF MINNESOTA

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## I. ANNOUNCEMENTS

1. Correction: Dr. Wetherby's analysis of new out-patients for October should have read 1930, not 1931.

The tendencies shown in the report may be summarized as follows: 15 years is the dividing line in the Admission Service between Pediatric Service and the General Admission Department. (20% were under 15, 80% over 15.) Almost without exception each patient received a complete history and physical examination and preliminary laboratory study. More patients were referred to other clinics over 15 than under this age. Difference 2.23 : 1.9. 27% of adult group were hospitalized, 18% of pediatric. 93% of the patients were handled satisfactorily judged by their return to other clinics. Many out of town patients can be studied in the Out-Patient Department with consequent saving of hospital cost and time. More than half are patients from the Twin Cities, mostly from Minneapolis. 46% x-ray consultations were positive (remarkable). More negatives were found in requests for examination of gastro-intestinal, gall-bladder, colon, lumbosacro-iliac, kidneys, ureters, and bladder regions. Note: The complaint about the lack of service from the x-ray department has now been adjusted and splendid cooperation is received. This was due to lack of assistance and came at the time the division was being moved. Out-patient department records are still deficient. Certain clinics are chief offenders while others make excellent showing. It is hoped that today Dr. Wetherby will be able to give his impression of the changed which have been brought about during the past year.

2. James T. (Ted) Mills, Grand Rapids Clinic, Wealthy Street at Summit Road, Grand Rapids, Michigan. Section, Surgery of Head and Neck; Eye, Ear, Nose and Throat and Plastic Surgery, Associated with Dr. Ferris Smith, writes that he is "enjoying the weekly reports of the General Staff Meetings." He has just been elected to full membership in the American Association of Oral and Plastic Surgeons and the American College of Surgeons. He is planning to be in the Twin Cities during the holidays and hopes

to see his friends at that time. Ted belongs to that growing group of Minnesota men who have made good in a big way.

3. Rudolph Engel who has spent the past year as Honorary Fellow in Pediatrics has left for his home in Germany. He assumes his old place as assistant to Prof. G. von Bregmann, Direktor der II Med. Klinik Charite - Berlin NW 6. He has worked on mineral and water exchanges in epilepsy as influenced by pituitary anti-diuresis with Drs. McQuarrie and Ziegler. Minnesota attracted him because of Dr. McQuarrie's outstanding work in this field. He has asked that our little weekly Staff Meeting Proceedings be sent to him in Germany which makes him "Minnesota's own" farthest from home. His many friends were sorry to see him leave and all join in wishing him success and happiness for the future.

4. Back Talk. Meeting October 29, 76 official attendance. Meeting, November 5, official attendance 84. Intussusception apparently proved of interest. Dr. Exner demonstrated x-ray consultations. Drs. Wangensteen, Stewart, McQuarrie, Scott, and Olson discussed presentation. It was interesting that all three cases are females. The literature shows that males predominate. Time is most important factor in end results. Clubbe states that cases under 20 hours duration do well but over 40 hours usually die. The barium enema (blood-less) treatment is tried here. However, many of our cases come in late and results have not been very satisfactory without operation.

Dr. Stewart gave a very valuable point in differential diagnosis of painful abdominal lesions in children. After locating the tender spot, to the best of his advantage, he then gives chloral making it much easier to palpate the abdomen. Tenderness can be still elicited without resistance on the part of the patient. In one of his cases, a piece of paper was found as the mechanical reason for the intussusception. It was thought that the temperature of the enema might be an important factor. Warm barium enemas (only) are used here. Apparently high mortality from the condition is not due to the operative procedure but to delay. Remarkable series quoted showed

that a large number of such cases could be operated with impunity if the procedure was done early. Chronic intussusception may last a year or more. In one case, eleven years standing.

Dr. Olson stated that young men going out into practice should be prepared to meet emergencies and plan their procedures in advance. If they have made up their minds to do a certain thing when a certain situation presents itself, it was much better to withdraw from the case than to be talked out of it by the family. Because none of us know where we are going to practice, we must plan on relying on our own judgment in all surgical and medical emergencies.

What is the cause of the remarkable frequency in the first year of life, especially in the months from five to seven? Hyperplasia of lymphoid tissue in region of the ileo-cecal valve has been repeatedly mentioned as the predisposing factor. Dr. Scammon supports belief as repeated studies show it to be very prominent at this time of life. The sex difference is not so easily explained on the basis of lymphoid tissue but may be responsible for the larger numbers with Meckel's diverticulum. Various types of operative procedures are described.

Meeting November 12. When is spinal fusion indicated? Dr. Exner demonstrated x-ray consultations. Dr. Cole stated that the onset of tuberculosis of the vertebrae may be very slow in adults. (Sometimes as long as nine years). Pain always precedes clinical recognition of disease in adults, not always so in children. Operations on the spine were first done in Europe. The operation in children does not appeal to Dr. Cole. In adults it is apparently all right but the regular treatment must be continued afterwards. It is very difficult to separate the results of the application of the brace from the operation itself. It is to be noted that a brace is always used after the operative procedure.

The operation is sometimes done in growing children. There is no guarantee that buckling will not occur although some orthopedists operate as early as 16 months. Union is impossible to predict even by x-ray method. In the present case (adult) only two bodies of the vertebrae were involved. Union and fusion

would have probably taken place with collapse (spontaneous). There is apparently good support for conservative treatment in cases of this type.

In the girl with spider fingers, the cause of death was not clear. The cardiac hypertrophy was of undetermined origin (congenital or acquired). Dr. Hilleboe gave the measurements stating that in all lengths she was from 4 to 7 cm. longer than an ordinary child of her own age. In circumference, she was from 2 to 4 cm. less than normal. Operative treatment of scoliosis is far from settled according to Dr. Cole. In this particular case, the weakness was due to muscular difficulty and success was very problematic. At the Shriner's Hospital they had a boy with this condition with enormous feet and hands (length). As the lens in the eye moved it could readily be seen when you talked to him.

Spinal fusion for scoliosis is probably not indicated except in a very limited number of cases. The technique is to operate through a hole in a plaster jacket. Shock is always a possibility in any operation on the bone and great care must be taken not to injure it by hammering or other rough treatment. The muscles must also be separated very gently.

The end results from spinal fusion and scoliosis are apparently not very satisfactory. The patient usually has to wear a support. After the age of 17 when bony growth has stopped, there will not be very much change and no great improvement. Dr. Ulrich suggests the possibility of cardiac imbalance as the mechanism of sudden death. Dr. Stewart asked "what are the indications for spinal fusion in scoliosis". Dr. Cole replied, "Only in cervical types is the operation really of value. Here it is simply a question of lessening the deformity and not really doing away with it. In scoliosis operative treatment lower down may be necessary in order to correct the list." Dr. Cole's conservative clear-cut analysis of the situation was greatly appreciated.

(To be continued.)

## II. CASE REPORT

### ADAMANTINOMA OF LEFT LOWER JAW. Path. Randall.

The case is that of a white female, 60 years of age, admitted to the University Hospitals 9-22-31 and died 10-13-31 (21 days).

#### Lump (2 years)

1929 - Patient noticed a small lump on the lower left gum. It did not pain but continued to grow larger, involving the left cheek.

#### Pain

7- -31 - Nine weeks ago, the left cheek and gum began to swell upwards from the mandible. The swelling protruded into the oral cavity. Pain started and progressed as time went on. Hot packs were applied. Patient consulted a dentist who incised the swelling in the mouth and obtained some blood but no pus. He told her that she had a tumor which was likely to be cancerous. He advised her to go to the Tumor clinic.

#### Out-patient

9-10-31 - Dispensary. Urine examination - albumen and sugar negative. Blood examination - Hb. 70%. Wassermann and Kahn - negative. Impression: 1. Essential hypertension. 2. Neoplasm of mandible; possible sarcoma, epilus, or adamantinoma.

#### X-ray

9-18-31 - Dispensary. Notation: Cystic tumor at angle of left mandible. Clinical diagnosis: Adamantinoma. X-ray of left mandible - Conclusions: Cystic disease of left mandible. Possible giant cell tumor.

#### Hospital

9-22-31 - Admitted to University Hospitals. Complaint: Swelling of left side of face in lower jaw region (2 years duration). Past history: Pneumonia in 1916. Family history: Mother died of heart trouble at 80 years of age. Cardio-respiratory system - negative. G. I. system - negative. Menopause at 50 years of age. Extremities - some varicose veins which ache somewhat when on feet. Weight - 200 lbs., one year ago; present - 185 lbs; present - 179 lbs.

#### Physical examination

Patient is well-nourished. Color is good. She is having some discomfort from her face. Appears weak, listless, and drowsy. Has to expectorate often. Belches considerable gas. Chest - normally and equally developed and excursion equal on inspection; no retractions or abnormal bulges. Lungs - Percussion - no relative dullness in any portion. Auscultation - breath sounds normal and relatively equal in all portions; no rales nor pleural rubs. Heart - loud systolic murmur at apex. Blood pressure 152/78.

#### Teeth out

Mouth - upper and lower plates; tongue - normal.

#### Tumor

Face - growth on lower left jaw which extends upward from the mandible 2 or 3 cm. and from angle of jaw anteriorly about 3 or 4 cm. There is a diffuse infiltration above the mandible involving the subcutaneous tissue upward over the zygoma and posteriorly nearly to the ear. There is also evidence of growth downward from the mandible itself. Laboratory: Blood - Hb. 82%, wbc's 6,900, Pmn 55%, L 44, M 1. Urine - sugar and albumen - negative, numerous wbc's, and clumps of pus. Progress: Does not complain of pain.

#### Operation

9-25-31 - Surgically prepared. 2:45 P.M. - Morphine sulphate gr. 1/4. Atropine sulphate gr. 1/100. To operating room. Operation: Preoperative diagnosis: Adamantinoma of the left angle of the mandible. Anesthesia - inhalation of ether. Preoperation: Iodin and alcohol. Incision - from the left angle of the mouth downward to the lower border of the mandible and then parallel to this posteriorly to the angle. Findings - a large tumor was found involving the posterior part of the body of the left side of the mandible and the left ramus extending up into the condyle and the coronoid process. The tumor was cystic and projected into the mouth over the alveolar process in one area. This area was about 1 cm. in diameter and elevated about 2 cm. The tumor was well encapsulated outside of this one area.

Procedure

Excision of the greater portion of the left side of the body and all the left ramus of the mandible, the bone being disarticulated at the temporo-mandibular joint. Preliminary to this procedure, however, the external carotid artery was ligated by making a vertical incision below the angle of the mandible on the left side. It was doubly ligated with chromic catgut, but its continuity was not cut.

Bleeding

Bleeding was quite profuse during the removal of the mandible especially in the removal of the upper portion. This bleeding apparently came in large part from the pterygoid plexus of veins. It was exceedingly difficult to ligate the veins in the temporo-mandibular fossa and a pack was applied to control bleeding. This pack was left in situ and the tissue sutured over it. It was brought out through the posterior part of the skin incision. The mucous membrane was closed with interrupted chromic catgut sutures. Skin was closed with Michel clips.

Fair condition

Pulse at beginning of operation 100, at the end 160. Duration of anesthetic 2 hours and 35 minutes, duration of operation 2 hours. Hyperventilated 15 minutes, t.i.d. Patient returned from the operating room in fair condition, color quite poor, pulse rapid but of fairly good quality. Proctoclysis 1000 cc. tap water. 6 P.M. - 1000 cc. 10% glucose intravenously. 1000 cc. normal saline subcutaneously started. Elevated foot of bed.

9-26-31 - 1:20 P.M. - Hypodermoclysis discontinued. Morphine sulphate gr. 1/4. Blood pressure 136/78. Temperature 102. Pulse 120. Respirations 22.

Dyspnoea

9-27-31 - 12:30 A.M. - atropine sulphate gr. 1/150. Had a very poor night. Breathing very labored. Pulse rapid but of good quality. Expecto- rates a large amount of mucus. Marked dyspnea at 2:45 A.M. 3 A.M. - oxygen tent started. 4 A.M. - oxygen tent discontinued. Mucus removed from throat with syringe and syringe. Breathing better.

Packing removed from cheek under ethyl chloride. Nauseated at times. Temperature 101. Pulse 110. Respirations 18-30.

9-28-31 - Gause pack removed from wound. Dry dressings applied. Patient is improving. Is able to take fluids. Throat is not as sore. Temperature 100. Pulse 100.

9-29-31 - All clips removed. 6 sutures out. Hydrogen peroxide and mercurochrome 2% and dry dressings applied.

Better

9-30-31 - Remaining sutures removed. Resting very well. No complaints.

10-3-31 - Temperature appears somewhat septic in type, 101.6 today. Pulse 95. Respirations 20. Wound appears to be breaking down and contains pus, on posterior part of left cheek.

Infected

10-4-31 - Irrigations with potassium permanganate 1 - 4000 every two hours. Note by Staff: Posterior part of mucous membrane incision broke down. There is a cavity in the left cheek which is exposed. This is to be irrigated.

10-5-31 - Patient is stronger. Sitting up in chair. Foul odor of drainage from mouth.

10-6-31 - Has diffuse purulent drainage from mouth.

10-7-31 - Irrigation of potassium permanganate to wound does not drain from inside. Hot packs to abscess on left side of neck. Complains of soreness on left side of face.

Hemorrhage

10-9-31 - Hemorrhage from wound inside of neck began at 8:05 P.M. Senior Fellow called, at 10 P.M. Medical transfusion of 200 cc. of citrated blood given. Blood pressure before transfusion 105, after 130/70. This had been preceded by 1000 cc. saline with 5% glucose, 1000 cc. of gum acacia. Wound had been packed by Senior Fellow. Bedding changed and pressure bandage applied. Patient's condition is fair. No bleeding visible. Pulse 104, of good quality. Morphine sulphate gr. 1/6, every four hours.

Hemorrhage continues

10-12-31 - 3:05 A.M. - began to bleed from neck. B.P. 132/70. 3:10 A.M. - Morphine sulphate gr. 1/6. Patient lost

approximately 150 cc. of blood. Packing inserted in interne. Note by interne:  
 3:05 A.M. - Hemorrhage from both external and internal parts of mouth. Old packing left in for fear of larger hemorrhage and new packs put in on top of the old in buccal cavity. B.P. 130/40. Apparently between 150 and 200 cc. of blood lost.  
 5 A.M. - small pack in mouth came out and about 75 cc. of blood. New pack applied. B.P. 96/40. Pulse good.

#### Another transfusion

12 A.M. - patient taken to operating room for transfusion and ligation of bleeding vessels. A small incision was made toward the abscessed area and extreme difficulty was experienced in ligating the vessels, due to excessive hemorrhage but mainly to the necrotic condition of the tissues involved.

#### Common carotid ligated

Several ligatures were placed around the common carotid and finally all bleeding was arrested. Patient suddenly stopped breathing and pulse was not perceptible. Artificial respiration and adrenalin in heart (directly) was given. She was revived and transfused again. B.P. after transfusion 150/80. 8 P.M. - B.P. 150/76. Pulse rapid, 120. Respirations 30. Much mucus and patient not yet conscious. Having had gas at 12. 10 P.M. - condition gradually becoming worse. Still unconscious. B.P. 140/68. Pulse 118. Respirations 23. 1500 cc. fluids given subcutaneously.

#### Exitus

10-13-31 - Condition apparently worse this A.M. B.P. 96/42. Pulse rapid and irregular. Respirations very rapid. Much mucus and foul, purulent, necrotic exudate removed from the mouth with sponges. Temperature 104 to 108 (R). Respirations 20 to 36. Patient never gained consciousness. 1:25 P.M. - condition suddenly growing worse. Considerable mucus in throat. Unable to get blood pressure. Perspiring profusely. Incontinent. 3:30 P.M. - adrenalin M xv. Seen by Surgical Staff. Pulse more rapid and weak. 4:30 P.M. - pulse 160. 5 P.M. - pulse almost imperceptible. Respirations shallow. 5:20 P.M. - ceased breathing. pronounced dead.

#### Autopsy

The body is that of a well-developed and fairly well-nourished, elderly, white female, measuring 162 cm. in length and weighing approximately 160#. Rigor is present. Hypostasis is purplish and posterior. There is no peripheral edema. There is slight cyanosis. No jaundice. Each pupil measures 4 mm. in diameter. There is an open wound at the angle of the left jaw extending down into the neck just above the clavicle along the sternocleidomastoid muscle. This wound is gaping. There is considerable fibrino-purulent exudate. There is a recent scar at the angle of the left jaw extending along the inferior ramus of the mandible on the left side and is well healed. There are puncture wounds in both antecubital spaces. The upper and lower teeth have been extracted and have been replaced by plates.

The surface of the Peritoneal Cavity is smooth, moist, and glistening. No increase in fluid. The liver and spleen are not enlarged. The organs are in normal relationship to one another. The pelvic organs are atrophic.

There is no increase in fluid in the Pleural Cavities. The lungs show a moderate amount of consolidation, especially at the bases. The organs are in normal relationship to one another. The Pericardial Sac is smooth, moist, and glistening. No increase in fluid.

The Heart weighs 460 grams (enlarged). There are a few hyaline plaques in the myocardium, represented by grayish-brown areas. The myocardium is firm, reddish-brown in color. The endocardium is smooth. The papillary muscles are somewhat hypertrophied. No evidence of valvular disease. The coronaries show a minimum intimitis. The Root of the Aorta shows very early atheromatous plaques.

The Right Lung weighs 700 grams, Left 550 grams. They are deep purplish-gray in color. There are a few adhesions between the visceral and parietal pleurae and at both apices. There is a moderate amount of consolidation at both bases. They cut readily and on section show a moderate amount of congestion at both bases with a patchy infiltration principally along the bronchi and bronchioles. There is considerable hemorrhagic exudate which is slight purulent in the bronchi

and bronchioles. It is fairly characteristic picture of early bronchopneumonia which is fairly diffuse in both lower lobes.

The Spleen weighs 75 grams. The capsule is wrinkled, purplish-gray in color, cuts readily, and on section shows the malpighian corpuscles and trabeculations to be distinct. The pulp scrapes.

The Liver weighs 1450 grams. It is grayish-brown in color. The edges are somewhat rounded. It cuts readily and on section shows a slight amount of fatty change. The lobulations are slightly indistinct.

The Gall-bladder wall is not thickened. There are a few adhesions around the neck. The mucosa is smooth. There is no evidence of stone.

The Pancreas and Adrenals are normal.

The Right Kidney weighs 140 grams, Left 150 grams. The capsules strip easily. On section, the medulla and cortex are distinct, the surface smooth, the kidneys appear somewhat pale, the glomeruli are slightly pale, and shows a moderate amount of cloudy swelling. There is an increased amount of fat in the pelvis.

The Genital Organs are atrophic.

Head. The scalp and calvarium are normal. The meninges are normal. There is no evidence of exudate over the cerebral hemispheres or cerebellum. Sections are made of the left side of the brain and no evidence of softening or hemorrhage is noted. The vessels of the circle of Willis show early intimitis but this is not extensive. As the carotid vessel courses through the foramen lacerum of the skull on the left side, there is a very definite antemortem clot. On the right side, the vessel is more or less collapsed and contains a very small clot.

#### Diagnoses:

1. Adamantinoma of the left jaw.
2. Antemortem clots in the left internal carotid artery.
3. Infected incision.
4. Bilateral bronchopneumonia.
5. Myocardial hypertrophy.
6. Early arterosclerosis.
7. Cloudy swelling of liver, spleen, and kidneys.
8. Anemia.
9. Puncture wounds both antecubital spaces.

### III. ABSTRACTS:

#### ADAMANTINOMA. Abstr. Shimonek.

##### 1. Historical.

Simmons: synonyms, adamantine epithelioma, cryptosarcoma, adenocarcinoma, and epithelial odontoma. Often confused with bone cysts, benign giant cell tumors and carcinoma. Term "adamantinoma" is derived from Greek word "adamas" meaning hardness of stone, (enamel), and enamel forming cell is called adamantoblast.

Malassez, 1885, suggested term "adamantine epithelioma" for tumors derived from enamel forming tissue. Borst 1902, introduced now generally accepted term "adamantinoma".

First description of true adamantinoma seems to have been made by Falkson, 1879. It was generally believed that adamantinomata were limited to jaw until Oranoff (1892) noticed resemblance of certain epithelial tumors of pituitary to adamantinoma of jaw. Since 1892, so many competent observers have confirmed observation that adamantinoma of the jaw and adamantinoma of pituitary are considered practically identical.

2. Pathology. Waldron in his chapter, "Tumors of the Oral Cavity" in Bunting's "Oral Pathology" states that by common acceptance the term "adamantinoma" now includes all forms of tumors which originate as overgrowths of epithelium of type normally present in enamel organs. They vary in size from small insignificant cellular overgrowths to enormous cystic enlargements extending from jaw to surrounding parts. (One tumor weighed 1.5 kilograms) Ewing states that an adamantinoma as large as a child's head was seen.

Adamantinomata which begin at alveolar border may excavate a cavity in the substance of maxillae and distend surrounding tissues to form cyst. The surrounding bone becomes thin and as it enlarges the cyst may rupture, the cavity becoming secondarily infected. Cysts are invariably multilocular. Cavities may be smooth walled or lined with epithelial projections. The walls are composed of fibrous tissue with occasional calcareous areas and masses of bone and cementum.

Substance of tumor is traversed by mass of fibrous tissue trabeculae which form bulk. (Stroma may be very cellular). In rare instances bits of well-formed enamel are present lying on shallow beds of dentine. Masses of epithelium and broad anastomosing strands of epithelial cells are prominent characteristics of the tumor. These epithelial masses undergo central degeneration and liquefy leaving central cavities in which there is accumulation of fluid. Stellate cells with distinct intercellular bridges are found, while about the periphery of the cavity, there is often a distinct layer of tall columnar cells resembling ameloblasts.

In the early stages of the tumor, is (clinically) solid, cysts are microscopic and may on section resemble glandular structure, and have been misnamed "adenoma adamantinum". Finally degeneration of septa leads to breaking down of walls the tissue cells being added to the cyst content. Larger and larger cysts then develop until one large cyst simulating a dental root cyst is seen.

3. Origin. Simmons, McFarlane, and Patterson mention four theories.

a. Broca (1869) in study of epithelial tumors of maxillae advanced theory that they developed from dental germs.

b. Falkson believes that in formation of enamel organs, that a surplus is formed and adamantinoma originates from additional dental germs. Supported by Hesse.

c. Buchtemann advanced theory that adamantinoma originates from mucous membrane or from mucous glands of mouth and extends into sinuses or along roots of carious teeth. This theory is supported by Kolaczek and Bland-Sutton.

d. Malassez' theory as explained by Rump, is that "adamantine epithelioma" arises from atrophied or isolated groups of cells about the roots of teeth which proliferate and give rise to a tumor similar to structure from which the debris is derived. Malassez termed these cell groups "debris epitheliales parodontaires" and showed them to be present in many normal fetuses, children, and adults. This theory is now generally accepted.

There is a wide difference of opinion in the literature as to whether irritations of inflammatory conditions or trau-

matism are instrumental in development of adamantinoma. New states that the lower third molar is most difficult tooth to erupt and also that this region of mouth receives the greatest amount of irritation.

4. Age. It is interesting to note that it develops in this region about the age of 33. New cites six cases of adamantinoma in the upper jaw in which average age is also 33 years. Of those in bicuspid region it is 16 (about ages in which these teeth erupt). (Hesse, Melassez, D'Aunoy, and Zoeller). Simmons and Kronfeld claim that no irritant is involved.

5. Metastasis. Adamantinoma of jaw is locally malignant but generally benign. (In the literature only two proved cases of metastasis, both reported by Simmons). Ewing states that he had two cases with metastasis but he does not give description of structure. However, Simmons gives photomicrographs which are undoubtedly metastases.

6. Clinical. Clinical history of adamantinoma is characteristic. They are slow symptomless growths. Usually absence of teeth in area involved and no inflammatory infiltration. X-ray and biopsy findings are characteristic. D'Aunoy and Zoeller say adamantinoma should be suspected when an area of bone destruction is larger than a five-cent piece but never to make a diagnosis until biopsy. Bloodgood mentions differential diagnosis between dentigerous cyst and adamantinoma cannot be made until an exploratory operation is done. The former will be found to consist merely of a large cyst and the latter a white, finely granular tumor containing connective tissue trabeculae with small cavities.

7. Reported cases: McFarlane and Patterson in review of reported cases of adamantinoma found 166 cases. In 118 of these, sex was given (75 females and 45 males.) These figures seem to be in agreement with others. Age in 114 cases, youngest 6 months and oldest 75 years (average slightly less than 40 years.) These are ages in which patient reported to hospital and not those in which the symptoms were first noted.



Simmons reported 14 cases, states the average length of time between onset of symptoms and examination by a physician was 9 years. In 166 cases mentioned above, 114 mentioned site of tumor, 96 were in lower jaw and only 27 in upper. (In 1 tumors in upper and lower jaws). Of those occurring in lower jaw, the side was not given in 5, in 12 tumor was in midline and extended to both sides. In 27 the tumor was on right and in 52 on left. In 17 upper jaw, the right was affected in 8 and the left in 8 and both in 1. In 74 cases, the character of the tumor was described. (49 cystic, 8 solid, and 12 definite polyp and cystic areas.

3. Treatment. Consensus of opinion is that radical resection of affected jaw should be done at first operation. Incision, drainage, curettage, excision of tumor with part of jaw, excision of tumor along, x-ray, ray and coagulation, cautery, and total or partial resection were all tried in report of 166 cases. Simmons, D'Aunoy, Zoeller, and Bloodgood report series of cases in which no previous operation had been done. In all, the bone involved was completely resected and there was a permanent cure. However, if previous incomplete operation has been done, resection failed to cure. Conservative operations are insufficient. Some permanent cures have been reported after such treatment, but rarely are incision, curettage, or partial excision followed by anything except return from the tumor.

9. Adamantinoma of the hypophysis:  
Of 166 cases, 26 were adamantinoma of the hypophysis. The location was given in 22 cases, 17 were suprasellar, 1 in front of sella, and 4 in sellar substance itself. 14 of these cases were females and 12 in males. Age: 6 to 60 years, average slightly less than 24. Operative removal is recommended as only cure. Mortality is very high either with or without operation but operation is always indicated. Five who had no operation died shortly after admission to hospital, four had no records of operation, and of the rest, all were operated on. In most cases, the contents of tumor were evacuated and part of the cyst removed. Of these, all but 3 died. In the cases reported by Havel and Jackson, the lesion was drained transsphenoidal route and cyst curetted

but it recurred in 2-1/2 months. The second and third operations were performed and the patient was well in every respect three years later. In the cases of Peet, the contents of the cyst were removed and the cyst curetted and most of its wall removed. Patient completely recovered. In the second case of Peet's, the contents and the wall of the cyst were entirely removed and this patient also recovered.

10. Other Locations: Four cases of adamantinoma have been observed elsewhere than in the upper jaw, lower jaw, and pituitary. The most interesting is reported by Fisher. There was an adamantinoma in the tibia (left) about size of hen's egg in a man of 46. The tumor was found to be entirely subperiosteal and (microscopically) it showed the typical adamantine structure. Another is reported by Wohl. It was a very hard tumor the size of a cherry located in the upper lip, not connected with the jaw. It presented a typical microscopic structure of adamantinoma. The fourth case reported by Giuffreda seems to have been a basal cell epithelioma of the skin showing adamantinoid evolution. It occurred in the nasomalar-palpebral region in a woman of 85. The tumor cells have the peculiar shape seen in adamantinoma but it considered a basal cell carcinoma showing adamantinoid resemblance or evolution. McFarlane and Patterson were able to draw the following conclusions from their review of the cases reported in literature.

#### Conclusions:

1. Adamantinoma arises in the jaws from paradental epithelial debris and in the hypophysis from squamous epithelial debris of hypophyseal duct.
2. Irritation may be cause of these tumors in the jaw but probably not in pituitary.
3. Adamantinoma in whatever location has approximately same histological structure.
4. They are locally malignant but generally benign, and do not metastasize. (2 cases reported by Simmons seem to be exception).
5. Cases have been reported elsewhere, 2 in the tibia, 1 in upper lip, and a doubtful one in the nasal region.
6. Adamantinoma of the jaw is more

common that those in pituitary. They occurred in women and men in proportion of 3 to 2.

8. Average age is 40 years at time patient entered hospital.

9. The average duration of symptoms is 7 years.

10. They occur in the lower and upper jaws in the proportion of 5 to 1; twice as often in left lower than in right.

11. In the upper jaw, the two sides were evenly affected.

12. There are about 6 cystic to 1 solid tumor.

13. Only complete radical excision seems able to cure.

14. 26 cases of adamantinoma of the pituitary have been reported, 90% were suprasellar in position.

15. Average age is 24 and average duration of symptoms is 3 years.

16. The two sexes are about equally affected.

17. About 95% of these tumors are cystic.

18. Operation is always indicated but seldom cures.

**Note:** Carter advises preliminary ligation of external carotid before attempting resection of the jaw. His conclusions are in accord with other reports. Reports preliminary ligation of external carotid in one case and temporary occlusion of common carotid in another considerably facilitated removal of two huge tumors in his series. Nasal tubes are used for feeding.

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You are referred to the article by Frazier, C. H., and Alpers, B. J., Arch. of Neur. and Psych. 26:905-966 (Nov.) 1931 for excellent report of 14 Adamantinoma of Craniopharyngeal Duct and report of Squamous Epithelial Rests in the Hypophysis Cerebri by H. T. Carmichael in same issue (966-976) Mayo Clinic.

Frazier and Alpers say in part that these tumors occurred 14 times in 244 sellar and parasellar lesions.

Classification of tumors in duct:

1. Adamantinoma (ameloblastoma).
2. Rathke's pouch.
3. Carcinoma.
4. Teratoma.

Duration varies from months to years. Sexes are equally distributed, children and young adolescents predominate (important). Endocrine picture is chiefly Frölich's syndrome, arrest of growth, cachexia, somnolence, low basal rate, signs of increased intracranial pressure, changes in fields and calcified deposits in sellar regions in x-ray (never seen in adenoma but seen in Rathke's pouch growths - less common). Prognosis is poor with or without treatment. Tumors resemble those seen in jaw in every way except for formation of enamel and arise from all remnants of ducts found in many normal specimens. (Have joint origin from oral cavity). Carmichael found masses of cells resembling squamous epithelium in 33% of 55 hypophyses removed at autopsy. In 8 subjects less than 20 years no cells were found. In 46 adults they were found in 40%. They apparently do not differentiate at time tumors are most frequent.