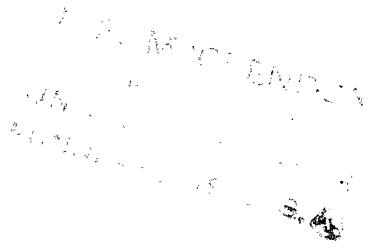
Staff Meeting Bulletin
Hospitals of the . . .
University of Minnesota



Congenital Intestinal Atresia

Volume VIII | Thursday, April 15, 1937 | Number 24

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume VIII | Thursday, April 15, 1937 | Number 24

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Published for the General Staff Meeting each week
during the school year, October to May, inclusive.

Financed by the Citizens Aid Society

William A. O'Brien, M.D.

I. LAST WEEK

Date: April 8, 1937

Place: Nurses' Hall
Recreation Room

Time: 12:15 to 1:15

Program: Movie: The Land of Evangeline.

Abstract: None.

Case Reports:

1. Carcinoma of Liver
   Lipoid Histiocytosis
   Atrophy of Bones

2. Ankylosing Arthritis, Marie-Strumpell Type
   Amyloid Contracted Kidneys

3. Sarcoma of Kidney, with Extension into Heart
   Tabes Dorsalis

Present: 119

Discussion: R. Ransom
L. G. Rigler
A. A. Nelson
Irvine McQuarrie
L. Cottrell
C. J. Watson
R. M. Johnson
F. Hoffbauer

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II. GUESTS

Warren H. Cole
Professor of Surgery
University of Illinois
College of Medicine

Members of Post-Graduate Medical Institute in Roentgenologic Diagnosis:

Frank J. Anderson	Minneapolis
Joshua H. Armstrong	New Richmond, Wis.
A. I. Arneson	Morris
Edgar W. Bedford	Minneapolis
B. J. Bouquet	Wabasha
W. L. Burnap	Fergus Falls
Robert M. Burns	St. Paul
B. J. Cronwell	Austin
Robert Davies	Nopeming
F. H. Dubbe	New Ulm
Geo. F. Engstrom	Belgrade
C. L. Farabaugh	Owatonna
Mary C. Ghostley	Puposky
S. W. Giere	Benson
Richard B. Graves	Red Wing
Roger G. Hassett	Mankato
Rolv S. Hegge	Austin
W. W. Higgs	Park Rapids
Rolf Hovde	Winthrop
E. G. Hubin	Deerwood
E. W. Johnson	Bemidji
O. V. Johnson	Fergus Falls
Raymond V. Jolin	Grand Rapids
M. W. Kemp	Anoka
A. L. Lindberg	Wheaton
Ralph E. Moyer	Minneapolis
J. A. Riegel	St. Croix Falls, Wis.
Philip E. Stangl	St. Cloud
Olaf S. Werner	Cambridge

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III. MOVIE

Title: Tiny Water Animals

Released by: Erpi Picture Consultants, NYC

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IV. ABSTRACT

CONGENITAL INTESTINAL ATRESIA

W. F. Bowers and L. Titrud

History

The first report of congenital intestinal atresia in the literature is that of Calder in 1733, but a thorough exposition of the subject was not made until 1877 when Theremin published his treatise. Since that time, a fairly voluminous literature has grown up, dealing with these interesting conditions. The following discussion relates essen-

tially to atresias of the intestine and but brief mention is made of imperforation of the anus, which is readily diagnosed on digital examination.

Incidence and Site

Farr and Brunkow in 1925 stated that the usual incidence of atresia of the intestinal canal, exclusive of the pylorus, rectum and anal canal, is one in 20,000 births. The majority of intestinal atresias are located in the duodenum, only about 1 in 10 being found in the colon. Complete atresia is much more rare than partial obstruction. Complete obstruction is most frequently observed in the duodenum at the level of the ampulla. The next most frequent site of complete atresia is the lower ileum. Multiple atresic areas are most often found in the jejunum and ileum, stenosis and atresia frequently coexisting.

Etiology

Many theories as to the causation of congenital occlusion of the intestine have been advocated and the following table is compiled from the papers of Loitman, Cole, Heckel and Apfelbach and Ladd.

Group I: Malformation or Arrest in Course of Normal Development

A. Intrinsic obstruction: Interference in the continuity of the lumen due to intra-intestinal defects.

1. Tandler and Kreuter found the original lumen of the gastro-intestinal tract of most vertebrates to be lost in early embryonic life by epithelial proliferation and later re-established by vacuolization. They assumed that there was a failure of recanalization.

2. Bland Sutton maintained that atresia occurs at the sites of embryonic events, as at the junction of the rectum and anus, at the ampulla of Vater or in the region of Meckel's diverticulum.

3. Hypertrophy of the valvulae conniventes is also given as a cause of intestinal occlusion.

B. Extrinsic obstruction: Interference in the function of the intestine by maldevelopment of adjacent structures.

1. Congenital abnormalities in the pancreas may cause intestinal obstruction at any point down to Meckel's diverticulum. Annular pancreas usually causes stenosis of the duodenum, while aberrant pancreatic tissue may cause obstruction in any derivative of the foregut. This aberrant tissue often becomes pedunculated and polypoid in character and may obstruct directly or by causing intussusception.

2. Anomalies in development of the mesenteric artery - Jaboulay, 1901.

3. Abnormal twisting of the mesentery caused by faulty rotation of the bowel, with or without vascular occlusion.

4. Abnormal development of the vitelline duct.

Group II: Disease of the Fetus

1. Embolus of the mesenteric artery - Durante.

2. Fetal syphilis.

3. Volvulus - Gartner, 1863.

4. Fetal peritonitis - Fiedler, 1864, and Theremin, 1877.

5. Intussusception with absorption of the necrotic loop of bowel - Chiari, 1888.

6. Intrauterine enteritis - Thorel, 1899.

Classification of Types

Atresia of the intestine may be classified into 3 groups according to Forssner.

A. Presence of a mucosal membrane which occludes the lumen.

1. Complete septum - usually in the duodenum near the ampulla.

2. Incomplete septum - probably represents an abnormal development of the valvulae conniventes.

B. Presence of a cord which connects the proximal and distal segments. This cord is composed of serosa, muscularis and submucosa. The mesentery is usually present but the vessels are atrophic.

1. There may be complete absence of the epithelial lining.

2. The mucosa may be represented by scattered clumps of epithelial cells.

3. There may be a solid core of epithelium.

C. Two separate segments of intestine.

1. Proximal and distal ends are contiguous and the mesentery is usually intact.

2. Proximal and distal ends may be at varying distances apart. The mesentery may be present but usually shows a defect in the area of agenesis of bowel.

Pathology

In complete obstruction, the proximal bowel is characterized by marked distention and thinning of the walls with microscopic evidence of hypertrophy of the muscularis. The distal bowel is empty and the lumen is very small, barely admitting a probe because it has never been subjected to the hydrostatic dilation of amniotic fluid. In cases of incomplete obstruction, the proximal bowel is grossly thicker than normal and only moderately distended. On section, the muscularis is seen to be greatly hypertrophied. The distal bowel is relatively collapsed but the lumen approaches the normal in caliber.

Death in cases of intestinal atresia results from:

1. Generalized peritonitis from rupture of the proximal bowel.

2. Inanition.

3. Vomiting, dehydration, alkalosis and demineralization.

History and Symptoms

In cases of congenital atresia, the history is most valuable in diagnosis. The important points are vomiting and absence or abnormality of the meconium. Early appearance and severity of vomiting is in direct proportion to the level of the atresia. Absence of meconium indicates a relatively low obstruction and absence of bile pigments, places the lesion below the ampulla or else indicates a congenital anomaly of the bile ducts. Vomiting of amniotic fluid is said to be pathognomonic of a relatively high atresia and bile in the vomitus indicates that the lesion is below the level of the ampulla. In infants with imperforation of the anal cana and rectum, unlike adults with acute obstruction of the colon on the left side, vomiting is the rule, despite the fact that the distention usually concerns only the colon. Low obstruction is said to be accompanied by borborygmus.

Diagnosis

As Farber and Ladd have indicated, demonstration of the presence of amniotic fluid contents in the meconium is of extreme importance. Normally, meconium is composed of:

1. Swallowed liquor amnii containing vernix caseosa, lanugo hair and cornified squamous epithelial cells.

2. Bile and pancreatic secretions.

3. Intestinal secretions.

4. Desquamated intestinal epithelium.

Atresia occurs before the third month of embryonic life, whereas vernix and cornified epithelial cells are not present in the amniotic sac in large amounts until the last few months of pregnancy. Consequently, if atresia is present, the meconium will contain none of the amniotic sac contents. Therefore, demonstration of the absence of cornified squamous epithelial cells in meconium is proof of the presence of atresia of the intestinal canal. The test is made by staining an etherized smear of meconium with methyl violet and destaining with acid alcohol. The cornified epithelial cells, if present, are not destained as are the other types of cells.

Physical examination

Physical examination usually reveals abdominal distention of greater or lesser degree but is not of great diagnostic importance. In cases of high atresia, the distention tends to be limited to the upper abdomen, while in low atresia of the colon, the distention is largely limited to a horseshoe shaped area conforming to the area occupied by the large bowel, due to the fact that the ileo-cecal valve is normally competent and prevents retrograde distention of the small bowel. Physical examination cannot be relied upon in localizing the area of atresia for two reasons:

1. Atresia of the duodenum has been seen to cause such marked gastric distention that the stomach filled the entire abdomen.

2. In cases of congenital anomalies, the bowel segments do not necessarily occupy their normal positions in the abdominal cavity.

X-ray examination

X-ray examination is of the greatest value in making the diagnosis as well as in localizing the area of atresia. A simple flat plate of the abdomen will often make localization possible by demonstrating the extent and delimitations of the distention. Barium, if used at all, should be administered cautiously and in small amounts because of its well recognized propensity for converting a stenosis into a complete obstruction.

In atresia of the anal canal and rectum, Wangensteen and Rice have advocated roentgen examination of the infant in the inverted position, with an opaque disk over the anal plate or with a rectal thermometer inserted into the canal. Observation of the degree of proximity of the gas bubble in the bowel and the opaque object at the anus will often give valuable data concerning the feasibility of an operative attack and the magnitude of the necessary procedure.

Differential diagnosis

Congenital intestinal atresia is usually readily diagnosed on the presence or absence of bile in the meconium and vomitus and on the absence of cornified epithelial cells in the meconium. However, occasionally pyloric stenosis may have to be excluded. In pyloric stenosis, a barium meal is rarely more than 80% retained in the stomach. Retention is absolute in atresia and the atresic area is never in the pylorus. Congenital stenosis is quite rare in the duodenum and here a characteristically small lumen would be demonstrated on x-ray. Pyloric stenosis usually does not cause symptoms until the second or third week, whereas congenital stenosis or atresia caused marked symptoms within one or two days. Esophageal stricture causes immediate regurgitation and if there is a tracheal fistula, cyanosis follows any attempt at ingestion.

Prognosis

The prognosis in cases of congenital intestinal atresia is extremely grave. Davis and Poynter, in 1922, were able to collect 401 cases from the literature and of this number only two patients had survived operation. The first reported survival was the case of Fockens in 1911 and the second was that of Ernst in 1916. In both of these instances, anastomosis around the atresic area was done. In a fairly high percentage of cases (1 in 20), the atresias are multi-

ple and so far none of these patients have survived. In untreated cases, the survival period averages six days, although Theremin described an infant with a low ileal atresia, who lived for three weeks. Some patients with incomplete obstruction live to adult life, having intermittent attacks of vomiting or other symptoms depending on the degree and level of obstruction.

Treatment

It is generally conceded that an attempt at surgical correction is indicated as soon as the diagnosis of intestinal atresia is established, it being argued that in a condition which is always rapidly fatal if untreated, nothing can be lost by operation and cures can be effected in some instances. Obviously, if an operative attack is to be made, it must be made early before dehydration, alkalosis and demineralization have occurred. It is customary to fortify these patients by administration of saline, glucose, Hartman's solution or blood transfusion before the operation.

Anesthesia and Conduct of the Operation

It must be borne in mind that these tiny patients will not tolerate loss of body heat and fluids. Consequently, external heat must be judiciously applied during the operation and fluids must be given pre- and post-operatively. Light ether anesthesia is satisfactory but care must be taken to see that aspiration does not occur, particularly if the obstruction is high, when operative manipulation is apt to cause regurgitation. Local novocain infiltration may be used alone or in combination with ether, to reduce the quantity of ether needed. In these cases, technical facility is a valuable asset to the surgeon because the procedure should not be unduly prolonged.

Choice of Operation

Duodenal atresia is mot often treated by gastro-jejunostomy but Ladd finds that this procedure is usually followed by marked duodenal stasis which may require a secondary operation for relief. It is his opinion that duodeno-jejunostomy is the procedure of choice and should be used primarily in every case. He states that gastro-enterostomy should be performed only in patients whose general condition is too poor to permit duodeno-jejunostomy, which is a more difficult procedure.

It is well known that infants tolerate enterostomy tubes poorly and their insertion should be employed only as an emergency in atresias of the jejunum and ileum. The procedure of choice here is side to side anatomosis between the proximal dilated and the distal collapsed bowel. Wangensteen distends the collapsed distal bowel by injecting air into the lumen through a fine hypodermic needle in order to cause the bowel to attain a size commensurate with that of the proximal loop, thus facilitating the anastomosis, which is quite difficult at best. Ladd obtains the same result by dilating the bowel by inserting a catheter into its lumen. Ladd uses a single layer of silk suture placed in the Connell manner for his anastomosis.

If the condition of the infant will not permit primary anastomosis, exteriorization of the atresic loop with frequent aspiration to relieve the proximal distention may be simply and successfully employed. Anastomosis may then be accomplished subsequently when the patient's condition permits and the bowel is then returned to the peritoneal cavity.

Atresia of the large bowel may be treated by primary anastomosis or by a Mikulicz type of procedure with subsequent closure of the colostomy after crushing the spur.

Results

Ladd, in 1933, reviewed 349 articles and found a total of only 29 patients who had survived operation. To this small list, he made the remarkable addition of 17 cured cases out of his group of 60 patients. In his hands, ileostomy was 100% fatal in 20 cases whereas ileal anastomosis was accompanied by a 60% mortality. For duodenal atresia, he reported 13 out of 17 cases cured by duodenojejunostomy, whereas

9 cases treated by other types of operation expired.

Conclusions

1. Congenital intestinal atresia occurs in about 1 in 20,000 births and untreated cases are fatal on an average of 6 days.

2. Important diagnostic points are vomiting and absence or abnormality of the meconium.

3. Absence of cornified squamous epithelial cells in meconium is positive proof of the presence of atresia of the intestine.

4. The x-ray is valuable not only in establishing the diagnosis but in localizing the area of atresia.

5. Enterostomy should not be employed as a method of treatment as a review of the literature shows only one patient to have survived this procedure.

6. Anastomotic procedures have been successful in about 48 cases up to the present time.

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V. CASE REPORTS

1. Baby Boy ' .
Hosp. No.

ATRESIA OF PELVIC COLON

Admitted 10-31-33 to the Pediatric Service at the age of 2 days. Delivery had been normal except for some difficulty in initiating respiration. No meconium had been passed since birth. Urination had been normal. All feedings had been regurgitated.

Examination revealed a very jaundiced child, with a slight cyanosis of hands and feet. Abdomen was distended, but had no palpable masses. Anus was present, but it was found impossible to insert a thermometer rectally beyond two inches. In other respects, the child appeared normal.

A flat abdominal x-ray with the baby inverted demonstrated that gas stopped abruptly in the colon at the level of the 3d sacral vertebra. A thermometer in the rectal pouch was seen extending to the level of the 4th sacral vertebra. A septum of density reached between the gas level and the thermometer. This study suggested an atresia between the rectum and colon.

The abdominal distention increased rapidly, necessitating immediate surgical intervention. By means of posterior dissection, it was found impossible to communicate the rectal pouch with the colon. Therefore, through a lower left quadrant incision, a tube was fixed within the lumen of the presenting loop of bowel. Patient returned to ward in good condition.

The next day, food regurgitation recurred. Cyanosis necessitated oxygen administration. Fluids were given. However, 36 hours postoperatively, the baby succumbed to an acute respiratory collapse.

Autopsy revealed the sigmoid colon ending abruptly at the pelvic rim, being connected inferiorly by a fibrous cord with the rectal pouch at the level of the pelvic floor. The duodenum was markedly dilated and had thickened walls. The enterostomy tube was found entering the jejunum distal to which heavy adhesions caused a mechanical obstruction of the small bowel. A generalized peritonitis was present.

2. ' .
Hospital No. '

ATRESIA OF DUODENUM

A white girl born 2-10-30 was admitted to the University of Minnesota Hospitals at 11 A.M., 2-16-30. Birth had been normal except for the presence of hydramnios. Regurgitations had occurred about 5 minutes after each feeding during the first three days. During the 3 days before admission, forceful vomkting had occurred at intervals up to 40 minutes after each feeding. The vomitus was not bile stained. The first stools were bile colored; the later ones became very scanty. Weakness and weight loss were progressive. On the day prior to hospitalization, a complete barium meal retention had been seen in the stomach.

Examination revealed a weak, dehydrated infant weighing 2200 grams and 45 cms. long. No tumor or peristalsis was seen on examination of the abdomen.

X-ray demonstrated barium taken the previous day to be still in the stomach. No barium had passed into the small intestine. The stomach was seen to be markedly distended with gas. Additional barium failed to pass through the stomach. A diagnosis was made of an atresia of first part of duodenum.

After hypodermoclysis, the 6 day old child was operated on at 9 P.M. With local anesthesia, through a right rectus incision, the peritoneal cavity was opened. Complete atresia of the duodenum at a distance of 2 cm. from the pylorus was found. The stomach and proximal duodenum were very dilated. Below the obstructive area, the entire intestine was collapsed. After inflatior of the collapsed distal loop by means of injection of air through a hypodermic needle to facilitate the procedure, an

anterior gastroenterostomy was done.

The patient appeared to be in good postoperative condition and continued so until 3 A.M., 2-16-30, at which time death suddenly followed an irregularity in the respiratory and cardiac rhythm.

Autopsy disclosed a dilated stomach, as well as a complete atresia of the duodenum. An annular pancreas separating the proximal and distal segments of the duodenum apparently had been a causative factor in the failure of a continuity of the bowel. The common bile duct was found to empty into the most proximal part of the duodenum beyond the atresia. This was in agreement with the presence of bile -tinged meconium in the lower part of the bowel as observed in the stools preoperatively.

3. J
Hosp. No.

IMPERFORATE ANUS

Patient was normally born 5-22-33. The following day, the absence of an anal opening was discovered. The baby was normal otherwise except for a moderate abdominal distention.

On the day of admission, 5-23-33, x-ray of the inverted child revealed gas in colon extending to within an inch of anal orifice at which level a thick septum occluded the lumen. The diagnosis of imperforated anus was confirmed.

Two days after birth, the baby was operated on. Through a posterior incision, the rectum was found in the hollow of the sacrum connected with the anal dimple by a fibrous cord. A catheter was tied in the rectum and the gut was anchored to the skin.

Postoperatively, a cellulitis developed, which subsided in time. Digital dilatations were done daily for about 4 months to maintain an open anal orifice.

Because of difficulty in preventing the anal opening from closing a colostomy was done 8-30-33. The postoperative course was complicated by a pyelonephritis which improved.

8-20-34 - Rectal orifice was reopened after the cicatricial stenosis and the periphery were sutured to the skin. Postoperatively, the lumen was manually dilated.

11-1-34 - At approximately the age of 18 months, the patient returned to have the colostomy closed. A satisfactory recovery followed.

Patient was last seen in the Surgical Dispensary 11-5-35 and appeared to be in good health. Another operation may be done, however, to establish sphincter control.

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VI. GOSSIP

Because of illness, Morris Fishbein will not be with us next week. The program planned for that meeting will be given at a later date in conjunction with Pharmacologist Raymond Bieter.....The post-graduate medical institute in roentgenologic diagnosis is being held this week at the Center for Continuation Study. It is another natural and the students and faculty like it. The group is very homogeneous as to interests and needs and good progress is being made. The class is with us today.....Grace Wiley, the snake lady, formerly at the Minneapolis Public Library, has a two-headed turtle in her collection. One head tries to get the other head's food but without success as the angle of insertion keeps each head on its own. It doesn't make much difference as the gastro-intestinal tracts join down the line. A few years ago one of her ratlers developed Pott's disease (x-ray diagnosis). It healed under x-ray therapy and hygienic measures, but the back remained stiff at the old tuberculous areas whenever the snake went into his coil.....Obstetrician Leonard Lang's grandmother was a midwife. When Papa Lang learned of Son Lang's choice of a specialty he wailed, "A midwife just like his grandmother."....The Department of Radiation Therapy recently had patient No. 5,000. The Citizens Aid Society gave the Cancer Institute to the University of Minnesota for the people of this State

It has served the people very well in addition to providing opportunities for the study and treatment of cancer. It is said to be the only cancer service officially connected with and operated by a University medical school.....The American Society for Cancer Research had a meeting of the Minnesota Branch last Tuesday night in the Anatomy Building. In spite of apparent attempts to keep people from knowing about it, a very large crowd turned out to hear a most interesting program. Bacteriologist Robert Green made a splendid talk on The Nature of the Virus and its Probable Relation to the Development of Cancer. Radiologist Arden Abraham reported the results of treatment of 333 carcinomas of the lip. Dr. E. T. Bell told of the two boys with carcinoma of the lower lip who are apparently victims of xeroderma pigmentosum as they are brothers. Most interesting was the exhibit of horned rabbits by Dr. Green and associates. .....We are very much in debt to Dr. Cole and the St. Paul Surgical Society for his appearance here today. He is their guest and we join with them in extending a welcome from the Twin City Medical profession and the Medical School. When we read his new book on the principles of surgery it will make his message much more personal. As Cole, of the Graham-Cole gallbladder dye combination, he is also well known. We hope that his stay will be pleasant and that he will return in the near future..... ...A woman who heard me say that early cancer could be diagnosed under the microscope insisted that her physician clamped his microscope on a lump under her rib margin to find out what it was. It was very difficult to assure her that the lump would have to be removed and sectioned and stained in the usual way. .....Famed Californian Herbert M. Evans will give two lectures on the pituitary gland and its functions on the campus next week. One will be under the auspices of the Minnesota Pathological Society and the other will be the Clarence Martin Jackson Lectureship sponsored by the Phi Beta Pi fraternity. We are fortunate in having this double opportunity to hear Dr. Evans.....The Fraternities have gone from Hell Week to a very formal school of instruction. Meetings are being held and tea is served. As the members sit sedately about the fireplace, they will read the new manuals on how to run a good fraternity and how to be a good fraternity man. The story in last week's Saturday Evening Post also suggests a change of the time in our colleges.....A recent writer remarked that by 19-something-or-other half of our people would be in institutions for the mentally disturbed and the other half would be working to support them. ....When Pathologist Berman of the Minneapolis General Hospital passed around a stomach containing an enormous cauliflower growth everyone wondered for just a few minutes before a report had been read and films shown which indicated that the stomach was apparently all right. With a knowing look Pathologist Bell took it in with one glance and pointed the finger of scorn in the direction of the X-ray department.

Roentgenologist Oscar Lipschultz was not to be so easily confused. With a bold sweep of his finger he ripped the cauliflower tumor apart, indicating that it was a head of cauliflower soaked in blood by prankster Berman on the first day of April, 1937.....The young son of Roger Hassett of Mankato recently confounded his nursery kindergarten teacher when she asked the children if they wanted to go to the toilet. He very proudly replied, "I defecated before I left home and I do not have to urinate now." His father, the genial shorty, in attendance at the Roentgenological course this week, is very pleased with his young son, but his teacher suggests that he bring a dictionary to school so that she can understand him.. .....An interns' baseball team is being formed to get into practice before the annual picnic season. One of the highlights of the hospital year has been the game between the staff and the interns.....After the story of the breaking of the unbreakable glass, several curious people have gone to the psychiatric unit to find out if it was true, and more glass has been broken as a result. Engineer Hamilton, in tapping some glass to show its unbreakable nature, broke it. Superintendent Raymond Amberg, in demonstrating how Engineer Hamilton had tried to show the unbreakable nature of the glass, broke his piece. Director McKinley broke his piece, showing the Hamilton Amberg, etc.