

# Gastric Analysis

Pages with reference to book, From 282 To 285

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## Definition

Gastric analysis is a method to measure secretion of hydrochloric acid under basal (Baseline) and augmented (stimulated) conditions.

## Indications

With the advent of more sophisticated techniques for diagnosis of Ulcer disease, indications of gastric analysis are now very much specific and limited. Gastric analysis is mostly done for estimation of acid secretion.

1. To confirm suspected Zollinger Ellison syndrome.
2. To demonstrate achlorohydia.
3. To estimate or reflect parietal cell mass.

Gastric acidity estimation is influenced by a number of factors, so instead of determining concentration of acid produced total acid output as a timed volume is determined to reflect a more complete picture of acid secretory capacity.

## Preparation of the Patient

1. Patient should be fasting 10 to 12 hours (preferably since bed time night before).
2. Patient should have not received any medications specially anticholinergic agent, H<sub>2</sub> blocker, Antacids since night before as they are liable to alter the results.
3. Weigh the patient prior to procedure.
4. Procedure should be explained to the patient in simple words.

## Equipments

1. A radio-opaque stomach tube 16 French size.
2. Emesis basin.
3. 50 ml plastic or glass syringe.
4. 100 ml graduated cylinder.
5. 1 ml. tuberculin syringe.
6. Adhesive tape.
7. Lubricant.
8. Indicator solution like phenol red.

## Intubation

1. Remove dentures if there are any from patient's mouth.
2. Take the Nasogastric tube and lubricate it.
3. Check patient's nostrils and choose the one (while patient still sitting up right with neck flexed) through which breathing is easier and nostril is wider.
4. Begin intubation by gently pushing the tube, some times tube gets-curved up in the pharynx and there is excessive coughing or gagging which may prevent further passage, at this time tube is drawn back a few inches, patient, is reassured and intubation is resumed.
5. During this insertion patient is instructed to swallow and continue to swallow throughout the intubation period. After the tube has progressed to approximately 40 cm (the first mark on the tube), the head may be allowed to resume its comfortable position.
6. Continue intubation by gently pushing the tube with the patient still swallowing until the fourth mark

or 65 cm is reached.

7. Tape the tube to the patient's nose with adhesive tape.

8. At this point patient is sent to the X-ray for fluoroscopy to check position. The tube should lie along the lesser curvature with the tip in the antrum of the stomach. In patient with partial gastrectomy tip of tube should be in the most dependent portion of the stomach.

### **Collection of Gastric Juice For Analysis**

1. Empty the stomach of its contents with a 50 cc. syringe and it should conpue until no more gastric juices is aspirated and syringe moves back and forth easily. After recording the pH volume and colour, this residual volume may be discarded. If residual volume is greater than 100 ml. or food particles are present possibility of outlet obstruction should be considered. In patients with delayed emptying stomach should be washed till it is clear<sup>7</sup>.

2. After emptying stomach of the residual volume, collection of gastric juice is begun under Basal conditions. At least four samples are collected each 15 minutes apart in separate containers. Collection may be carried out either manually with the syringe or by using a suction pump. During this procedure patency of nasogastric tube is maintained by injecting about 50 cc of air down the tube. Gastric fluid specimen should be spot checked as a guide to whether the patient is making-acid or is achiorohydric.

3. After having collected gastric juice under basal conditions augmented or stimulated gastric analysis may be carried out as follows:

According to choice, availability and age of the patient any of the two stimulants canbe used i.e. Pentagastrin (available as Peptavion most commonly used) administered by sub-cutaneous injection in the dose 6 mg per kg body weight. It has very few side effects. Second is Betazole (Histolog), minimum dose is 50 mg. and maximum dose is 1.5 mg per kg. body weight, this is also given sub-cutaneously. After injection of pentagastrin or Histolog collection of gastric acid is begun under stimulated conditions again 15 minutes a part total pf four to eight (with pentagastrin peak response is in 15-45 minutes and histolog peak response is in 30-90 minutes<sup>7</sup> samples are collected and marked 1,2,3,4,5,6, 7,8, in. separate containers. After completion of basal and stimulated gastric juice collection, specimen are sent to the laboratory for evaluation of following values.

1. Basal acid output (B.A.0)

2. Maximal acid output (M.A.0) i.e.sum of the four highest consecutive 15 minutes samples after stimulation.

3. Peak acid output (P.A.0) i.e. sum of the two highest consecutive 15 minutes samples X2.

4. Basal acid output and maximal acid output ratio as percentage (B.A.0/ M.A.O x 100).

### **Interpretation**

1. According to Samad -et al.<sup>4</sup> Basal acid output (BAO) in health was reported as 0.0. to 1.27 meq per hour and the upper limit of normal as 1.27 meq per hour. The maximum acid output to histolog stimulation in normal males was  $53.31 \pm 4.36$  and  $30 \pm 7.59$  in females. The peak acid output in normal subjects in response to 1.5 mg per kg of histolog, was 5.2 meq per hour with upper limit of normal 8.64 meq per hour.

2. In general it can be said that patients with duodenal ulcer will as a group put out more acid than the controls and that the patient with gastric ulcer as group put out less acid than the controls. The overlap for individual patients is great. Man tend to secrete more acid than women. There is also a decline in acid output after the age of 50. Patients with cancer of stomach secrete much less than the control group, but again the overlap is significant for the individual patient. This is why use of gastric analysis in the diagnosis of gastric ulcer duodenal and gastric cancer has (significantly) gone out of favour.

3. In patients with Zollinger Elliso syndrome as recorded by Aoyagi and Summerskill<sup>1</sup> Basal acid output of equal to or greater than 15 meq. per hour as well as ratio of Basal acid output to maximum acid output (BAO/ MAO) of greater than 50% is strongly suggestive of extra gastric source of gastrin stimulation especially when it is associated with high levels of serum gastrin.

4. In patients with achlorohydrria neither there is secretion, of hydrochloric acid in Basal conditions nor after stimulation with Histamin, penta gastrin or Histolog.

**Critical Comments**

1. Now a days acid output is reported in meq per hour contrary to before when the term clinical units (C.U.) and degrees of acid were in common use. Fortunately clinical unit values are same as meq. per liter of Hydrochloric acid. 1 clinical unit is equal to 1 milliequivalent Hydrochloric acid per litre (IC.U=lmeq/L). Thus clinical units can be converted to meq by multiplying with volume and dividing by one thousand.
2. Topfer's reagent should not be used to determine the end point, in standard gastric analysis since this reagent will indicate acidity when the pH is less than 3.5 and thus acidity in the range of 3.5 to 7 will not be determined with this reagent.
3. An alternate way of calculating meq/1 acid secretion is to measure pH of the gastric juice either with pH paper or preferably with pH meter and then by using a conversion table,

**Table I.**

Reference	Sex	No. of Patients	Acid Output (meq/hr.).				
			Normal		Duodenal Ulcer		
			Mean	Upper Limit Normal	Mean	Lowest value in Duodenal Ulcer	
Basal	4	M & F	12	0.2	1.27	2.05	0.01
Histolog	4	M	7	53.31	62.03	66.20	51.00
		F	5	30.00	45.18	68.10	39.70
Pentagastrin	5	M	18	25.0	45.00	43.00	15.00

meq per litre may be read directly.

**Table --II**

**Conversion Table.**

Normality		Normality		Normality	
PH	(meq/L)	pH	(9mEq/L)	pH	(mEq/L)
0.96	120.0	1.5	34.0	2.11	8.0
0.98	115.0	1.55	30.0	2.17	7.0
1.0	110.0	1.6	27.0	2.23	6.0
1.05	97.0	1.65	24.0	2.31	5.0
1.1	86.0	1.7	22.0	2.4	4.0
1.15	77.0	1.75	19.0	2.52	3.0
1.2	69.0	1.8	17.0	2.7	2.0
1.25	60.0	1.85	15.0	3.0	1.0
1.3	55.0	1.9	14.0	4.0	0.1
1.35	48.0	1.95	12.0	5.0	0.01
1.4	43.0	2.0	10.0	6.0	0.001
1.45	39.0	2.7	9.0	7.0	0.0001

Table (II) from meq per 15 minutes reading, number of meq per hour can be calculated.

4. While no one uses histamin, administration of Betazole may lead to flushing of the skin, feeling of

warmth, headache, and pain at the injection site. An occasional patient may experience a more severe reaction in the form of hypotension or difficulty in breathing. If the patient complains of dizziness, his pulse and blood pressure are low, patient should be immediately placed in Trendelenburg position and epinephrine 0.3 cc. to 0.5 cc of 1000 Aquaous solution should be easily available. In the patients with mild allergic reaction with Betazole anti histamin should be administered intramuscularly.

## **References**

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