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Clinical Evaluation of the Laboratory Tests of the Stomach

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ROENTGENOLOGICAL examination has eliminated the necessity of many of the formerly used laboratory tests. Gastric secretion, too, can well be determined from the roentgenological findings. Gastroscopy is of importance also in the diagnosis; in the differential diagnosis, however, gastroscopy often gives no more information than the Roentgen examination. None of all these methods, however, has enabled us to differentiate always clearly between an ulcerated or benign ulcer. The malignity to differentiate always clearly between an ulcerated or benign pedunculated fibroma, can only be determined by microscopical examination. In cases of multiple, broadly based fibromata it is sometimes impossible to determine, even with microscopical methods, whether they are malignant or benign.

Since roentgenological methods have been predominantly used, the value of gastric analysis has been reduced considerably. Nowadays gastric analytical methods should be performed subsequent to the roentgenological examination, when additional diagnostic data seem of importance. Gastric analysis does rarely give information, if all other methods fail. One of these occasions is the aspiration of microrests.

An exact determination of acidity, by titrometric methods is hardly necessary, because the secreted gastric juice has always approximately the same acidity in humans. Hyper- and hypoaacidity are in reality hyper- and hyposecretion, more or less reduced in acidity by gastric mucus, reflux of pancreatic juice and bile, or emptying of the stomach and swallowing of saliva.

If, as in the case of ulcer, the quantity of gastric juice is highly increased, the reducing effect of the gastric mucus and the other above mentioned reducing factors is correspondingly low; therefore we find the gastric juice hyperacid. Besides, there is a prolongel and sometimes a continuous secretion of gastric juice. We find the picture reversed in case of atrophic gastritis, as for instance in cancer, where the small quantity of gastric juice is easily reduced in acidity. Therefore, a titrometric determination of the acidity of gastric juice can never give exact figures. It is sufficient to have a simple estimate as to whether there is abnormally increased, normal, diminished or no secretion at all. This estimation is most easily accomplished with an indicator, as Dimethyl amido azobenzol in solution, or as a paper.

An estimation of total acidity is superfluous if a buffer-free meal or the histamin test is used. Fractional gastric analysis, which was first suggested by my coworker, M. Ehrenreich, is, apparently no improvement over the single aspiration, and shows only that there is a prolonged secretion of gastric juice concurrently with hyper secretion, and this fact is self-understanled.

For educational purposes fractional examination is of value, as the student is thus enabled to see for himself how the different types of food are changed in the stomach.

The following test meals are in use today:

1. Ewald Test Meal. (One roll and 200 cc. of tea)
   This test meal has a distinct disadvantage, as foods are introduced into the stomach which neutralize the free hydrochloric acid. After aspiration it is impossible to detect microscopical rests, and even macroscopical rests and sometimes blood traces can not be determined.

2. Ehrmann Test Meal. (200 cc. 5-6 volume per cent alcohol)
   This test meal is free from buffering effect, it increases secretion sufficiently, and it is colorless. For aspiration it is advisable to use a small gauge stomach tube with wide openings. In this way it is possible to get abnormal rests which may be contained in the stomach.

A modification of the author's method, which is in frequent use in this country, is 50 c.c. of 7% (by volume or by weight) alcohol. This method's main disadvantage is that, with the small quantity of fluid used, no real washing out of the stomach can be accomplished, and thus microrests may remain.

3. Histamin Test.
   This test has the disadvantage that the injection
induces, of course, a higher gastric secretion. Furthermore, histamin increases the secretion, even in the normal individual, to such an extent that it is almost impossible to differentiate between normal secretion and hypersecretion, caused by the presence of an ulcer. The Histamin test, however, is of importance for the determination of complete achylia due to pernicious anemia.

For practical purposes the author's test meal is the simplest and most convenient method. Because it is free from buffering substances, a determination of total acidity has not to be performed. The solution is transparent; thus it is possible to see the physiological color and the smallest amount of rests and cloudiness. The alcoholic solution is a sufficiently strong excitant for the gastric secretion, without being too strong, as for instance histamin. Alcohol has a certain euphoric effect on the patient which reduces the discomfort of the subsequent aspiration. The secretion of gastric juice, after the ingestion, is slightly weaker than the secretion induced after the ingestion of the Ewald Test Meal. Thus we may conclude in general that a glass of beer, which contains about 4 volume percent alcohol, proved it is not too cold, may well be tolerated by a peptic ulcer patient. Higher volume per cent alcohol induces, of course, a higher gastric secretion.

PROCEDURE

On empty stomach 200 cc. 5-6% alcohol by volume.
Alcohol USP 12 cc.
Aqua ad 200 cc.

It is possible, of course, to use white wine instead. A 200 cc. glass, or cup, is filled one-third full with white wine, which has generally 15 volume per cent alcohol, and filled up with water to 200 cc.

About one-half hour after ingestion of this solution, aspiration with a small diameter stomach tube is performed. The stomach tube should have wide openings to enable abnormal stomach contents to be evacuated. A duodenal tube cannot be used.

After the aspiration follows:
1. Inspection on
Odor
Color
Transparency or Cloudiness
Traces of Blood
Microrests
Macrorests, and other pathological findings.

2. Estimation of Secretion

<table>
<thead>
<tr>
<th>Color with Dimethyl-amido azo-benzol</th>
<th>Estimation Value</th>
<th>Interpretation of the Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Deep Red</td>
<td>+++</td>
<td>Hypersecretion</td>
</tr>
<tr>
<td>2 Red</td>
<td>++</td>
<td>Normal secretion</td>
</tr>
<tr>
<td>3 Orange</td>
<td>+</td>
<td>Normal secretion</td>
</tr>
<tr>
<td>4 Yellow-Orange</td>
<td>Traces</td>
<td>Hypossecretion</td>
</tr>
<tr>
<td>5 Yellow</td>
<td>0</td>
<td>Achylia</td>
</tr>
</tbody>
</table>

In case the aspirated juice is yellow-green or green, one adds one Estimate Value (+) as in this case a part of the acid has been neutralized by the regurgitating pancreatic juice.

When the aspirated gastric content is cloudy, it indicates "insufficient cleaning" of the mucous membrane, even if the roentgenological examination does not indicate lowered motility. We have found this symptom of insufficient cleaning of the stomachal mucosa in cases of hemorrhagic erosions, superficial ulcer of the mucosa, small cancer or fibromata. In case of increased secretion and stasis, findings show a specific odor of sarcina, in decreased secretion and stasis the odor of yeast and lactic acid is present. In benign stasis H₂S may be smelled occasionally. Disintegrating new growths give a definitely fetid odor.

Uffelmann's lactic acid test and the microscopic examination for lactic acid bacilli are still standard methods in the laboratory manuals. Lactic acid-forming bacilli (Boas-Oppler) and lactic acid-forming cocci start to grow in case of stasis, when no, or only limited, amounts of hydrochloric acid are formed. We can detect such stasis and its causes much better by roentgenological methods and subsequent gastric analysis, than by the antiquated Uffelmann method, or by microscopical examination.

The examination on occult blood, which is important in cases of ulcerations and new growths of the intestines and the papilla Vateri, is of not too great a value, as regards diseases of the stomach.

Examination of the blood picture is always preferable, as for instance in cancer, an increasing anemia, increase of sedimentation rate, and occasional increase of the polymuclear leucocytes are very characteristic.

SUMMARY

Since Roentgenological examination has come into general use, the value of gastric analysis has been reduced considerably. Therefore, it seems to be sufficient to perform gastric analysis subsequent to Roentgenological examination, to obtain in this manner additional data. The aspirated material should be examined for quantity, odor, color, traces of blood, transparency or cloudiness, and other pathological findings. Cloudiness is indicative of microrests and "insufficient cleaning" of the stomachal mucosa. It may be present, even if the roentgenological examination does not show a decrease in motility or other abnormalities.

Titrometric methods for quantitative determination of free hydrochloric acid and total acidity give no exact figures. There is no hyper- and hypoacidity, but in reality hyper- and hyposecretion, which can be sufficiently recognized by estimation instead of determination of pseudoexact figures. The fact that hyper-, hyposecretion and achylia are typical for special diseases is the only reason for the procedure. An estimation of the gastric secretion with dimethylamidoazobenzol as indicator is sufficient. The amount of gastric secretion varies according to the various test meals used.

Ewald's test meal has the disadvantage to buffing the secreted hydrochloric acid partially and to efface the findings in regard to microrests and blood traces. The histamin test stimulates secretion to such an extent that even the normal patient may show the picture of

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