CHAPTER III

MATERIAL AND METHODS
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Selection of Patients

75 consecutive patients suspected to have upper GI tumors, who attended the gastroenterology clinic and medical outpatient department or were admitted in wards have been prospectively studied clinically, radiologically and endoscopically.

Methods

All the patients were interviewed and history was recorded as per proforma attached. Besides, age and sex, the areas from which the patient came and his occupation were noted. Details regarding smoking, intake of alcoholic beverages and diet habits were recorded.
Clinical evaluation was done in each patient by recording symptoms, physical examination and routine radiological investigation.

**Symptomatology**

Various symptoms like dysphagia, chest pain, loss of weight, regurgitation of food, apoplectic cough, hematemesis, abdominal pain, presence or absence of mass or jaundice were recorded.

a) Regarding dysphagia - its onset, duration and progression was noted. The degree of dysphagia was evaluated by noting dysphagia to solids, semi-solids or liquid foods.

b) Details of abdominal pain as regards to its site, radiation, severity, type of pain, character, aggravating and relieving factors like relief with antacids or H₂ receptor antagonists were noted.

c) Symptoms such as epigastric bloating, postprandial heaviness, flatulence, belching,
nausea, vomiting retrosternal burning and bowel habits were recorded especially in elderly.

Examination

The general nutrition of the patient was assessed as 'average' or poor by noting evidence of significant weight loss. Pallor if present was noted as mild, moderate and severe. Lymph node enlargement was noted. Chest examination was done to look for signs of pneumonia or lung abscess. Abdominal examination was done as regards to any abdominal lump, ascites, hepatomegaly or any other mass. Bony tenderness, skin rash or any neurologic abnormality, if present were recorded.

Investigations

Following routine investigations were done:
- Hemoglobin and peripheral blood smear was done in each patient.

- X-rays chest was taken in most of the patients to assess evidence of metastatic lesions in the lungs
or aspiration broncho pneumonia or any other pathology.

- Liver function tests were done to assess for metastatic liver disease.

- Barium swallow was done in each patient who was clinically suspected to have esophageal neoplasms. It was omitted in those patients who had absolute dysphagia, were in poor general condition, had evidence of wide spread metastatic disease or with poor economic background. The tumor lesions were categorised as belonging to upper 1/3rd, middle or lower 1/3rd of the esophagus. The length of the tumor lesion (and width of lumen of esophagus at the minimum) was estimated. The abnormality produced by tumor on barium swallow was noted as dilatation proximal to the tumor, shoulder sign, a filling defect, strictureus lesion or abnormal esophageal axis. Esophagus proximal to the tumor was considered dilated when the widest width of this part was atleast twice as much as the widest width of the part of the esophagus below the tumor.
Remote Control Switches

VTN: Start/Stop switch for video tape recorder connected to CV-1.

ON/OFF: Switch for freezing the endoscopic image on monitor screen.

HELP: Preset switch for presetting the monitor in the preset monitor screen and resetting the moniter voltage. Monitor voltage reset: 170V

Waterproof Symbol (blue ring)

Suction Valve

Depress to activate suction

Stereo/stop switch for video tape recorder connected to CV-1.

HZ: ON/OFF switch for freezing the endoscopic image on the monitor screen.

M: Pressing this switch initiates the automatic transmission of the endoscopic image to the monitor screen.

Auto M: When the monitor is turned on, it automatically transmits the endoscopic image to the monitor screen.

Remote Control Switches

VIDEO: [Function]

MAST: [Function]

TRAIN/TEST: [Function]

PEP: [Function]

Distal End

Air/Water Spray Valve

Cover for endoscopic image to activate water spray for tile washing

Flexible Portion

Instrumental Channel

Indicates channel diameter

Light Guide

Flexible Portion

Suction Valve

Depress to activate suction

Stereo/stop switch for video tape recorder connected to CV-1.

HZ: ON/OFF switch for freezing the endoscopic image on the monitor screen.

M: Pressing this switch initiates the automatic transmission of the endoscopic image to the monitor screen.

Auto M: When the monitor is turned on, it automatically transmits the endoscopic image to the monitor screen.
Fig. 5  VIDEO ENDOSCOPIC SYSTEM
The long axis of esophagus was considered abnormal if any of the following criteria by Akiyama (1972) were present:

a) Tortuosity of the axis proximal to the tumor;

b) Angulations of the esophageal axis, which consists of - (i) axis deviation above and below the tumor; (ii) axis deviation of tumor itself and (iii) abnormal distance between the esophageal axis from the midline of the vertebral column.

Similarly, in patients who were clinically suspected to have stomach neoplasms, upper gastrointestinal series was done.

**ENDOSCOPIC EXAMINATION**

An upper gastrointestinal endoscopy was done in all patients using a GIF-XV10 Olympus electronic video image gastro intestinal endoscope and is shown in Fig.5.

Endoscopic System

This electronic video endoscopy system has
three essential components - an endoscope, a video processor and a television monitor.

**Principle**

This endoscopic system contains a charged couple device. A charged couple device (ccd) is one which consists of an integrated circuit, image sensors and depends on sensitivity of silicon to light. When light strikes a silicon strip, the electrical resistance of the chip is decreased and electrical charges are generated. These charges are made to move about in a silicon semiconductor material. This current or electron particles are moved up the semiconductor by changes in voltage on electrodes which are placed perpendicular to the channels on the semiconductor material. These electrical signals are fed into the video processor which converts the electronic signals to a standard television image which is seen in the television monitor (Sivak MV, 1986).

The Olympus GIF-XV10 endoscope used resembles.
the standard fibroscope of the OES series except that the viewing objective has been replaced by three buttons that control the freeze frame and the hard copy function. The video processor has controls which allows the endoscopist to vary illumination and to adjust the lines. The television display is a square image. The one used was new video limited color receiver-cum-monitor and it has a keyboard for entering marginal notes on video displays. A video tape recording of all or part of procedure could be obtained.

Some of the specifications of upper GI endoscope GIF - XV10 are as follows:
### Optical System

<table>
<thead>
<tr>
<th>Field of view</th>
<th>Direction of view</th>
<th>Depth of field</th>
</tr>
</thead>
<tbody>
<tr>
<td>120°</td>
<td>0° (forward viewing)</td>
<td>3 mm - 100 mm</td>
</tr>
</tbody>
</table>

- **Distal end**
  - Outer diameter: 9.9 mm

- **Bending section**
  - Range of tip bending:
    - Up 210°
    - Down 90°
    - Right 100°
    - Left 100°
  - Maximum deflection: 40°

- **Insertion Tube**
  - Outer diameter: 9.8 mm

- **Working length**
  - 1030 mm

- **Total length**
  - 1330 mm

- **Instrument channel inner diameter**
  - 2.8 mm

- **Biopsy forceps**
  - Minimum visible distance: 3 mm from distalend

- **Remote control switches**
  - Built in on/off switches: (VTR, Freeze, Release)

### MACROSCOPIC APPEARANCE ON ENDOSCOPY

#### A. Endoscopic appearance of Esophageal Tumors

Through the endoscope the macroscopic appearance of these tumors were recorded and they
were classified as follows:

a) **A Polypoidal** or cauliflower mass when it
protrudes into the lumen and cause obstruction.
It is usually covered by a dull, granular and
friable membrane and shows areas of ulceration.

b) **Stricturous lesion**

c) **Infiltrative lesion** : The wall of the
esophagus is thickened, stiff and non pliable
and mucosa showed nodules which may be
ulcerated.

d) **Ulcerative**

e) **Mixed**

Early carcinoma of esophagus is defined as
per the Japanese study group for esophageal disease -
1962 (Devita et al, 1982).

1. Polypid growth < 1 cm
2. Plateau type
3. Flat type
   i) Flat reddish
   ii) Flat coarse
   iii) Flat whitish
4. Erosive type
5. Ulcerative type
6. Mixed type
7. Multiple type

B. Endoscopic appearances for Stomach Tumors

Endoscopic appearances for stomach tumors were noted as:

1. Early Gastric Cancer (EGC):

It is defined as carcinoma limited to mucosa or submucosa regardless of size or presence of lymph node metastasis. It can be classified as:

a) Type I - Protruded or polypid lesion.

b) Type II - Superficial type - which can be

IIa Elevated type: It has an elevation of less than twice the thickness of mucosa. The elevation is usually irregular with central depression.

IIb Flat type: These lesions are difficult to identify and are
suspected on finding discoloration and surface dullness.

IIc Depressed type: These are most common and show an irregular white depression, occasionally with an island of mucosa inside. The covering mucosal folds often show an abrupt moth-eaten appearance and club shaped thickening.

c) Type III - Excavated or ulcerated type.

2. Advanced Gastric Cancer:

It confirms to one of the four types of gastric cancer of Bormann's classification.

a) Type I is a polypid carcinoma characterised by localised protuberances of various sizes. This cancer has a broad base.

b) Type II Non infiltrating malignant ulcer, the edge of which is usually raised and nodular but limited sharply by surrounding mucosa. The
mucosal folds converging the tumor are interrupted before they reach the edge.

c) Type III is an infiltrative carcinomatous ulcer and the edges are irregular.

d) Type IV is a diffuse infiltrating carcinoma, and the gastric wall becomes rigid (limitis plastica). Deep ulceration and nodular elevation may be noted.

ENDOSCOPIC BIOPSY

The biopsies were taken using the endoscopic biopsy forceps maintaining aseptic precaution. The biopsy forceps used for the study was kept immersed in 2% gluteraldehyde solution prior to the procedure. Each time it was taken out, it was washed and air dried.

Biopsies were taken from the margin and floor of suspected lesion under direct vision to increase the accuracy (Hatfield et al, 1975). In case of ulcerating lesions, the biopsies are taken from rim
and slough of ulcer as follows.

A - Slough
B - Rim
C - Half way down the slope
D - Base of slope
E - 1 cm out from base of slope

7-8 biopsies were taken from each lesion. Biopsy pieces were oriented and mounted on a blotting paper and then fixed in Bouin's solution. 4-5 micron thick sections were cut from each specimen and stained with hematoxylin and eosin stain to study the histology. Each section was examined by the same pathologist who was not aware of clinical or endoscopic findings.

International histological classification of upper GI tumors was follows, as discussed on page 14 of this thesis.
ENDOSCOPIC BIOPSY TOUCH SMEARS

The biopsy touch imprints were prepared from freshly taken endoscopic biopsies to a clean glass slide with a fine needle and smear made by gently pressing another slide over it and avoiding crushing of the biopsy sample. Immediately after preparation the imprint slides are placed in a coplins Jar containing equal volume of 95 percent alcohol and ether and fixed for a period of 5 minutes and then stained with Papani-coleou's stain and Giemsa stain. A minimum of 3 contact smear slides were prepared, each from different biopsy sample. The slides were coded and were read by the pathologist without prior knowledge of the biopsy report.

ENDOSCOPIC BRUSH CYTOLOGY SMEARS

Specially designed cytology brushes retrieve mucosal or surface fragments for evidence of malignant cells. The brush used is BC-9L type and contained within a sheath so that it could be extended from the
sheath to reach the area of lesion. The brush was introduced through the channel of endoscope and advanced to the lesion after bringing it into the centre of field. The brushing was performed by rotary movements of the brush. The brush was then withdrawn inside the plastic catheter after brushing and the brush and catheter are then brought out so that the material obtained remains intact.

Two brushings were taken in each patient and the material was then gently smeared onto the glass slides. The slides were dipped at once prior to drying in jars containing 95 percent alcohol fixative and then stained according to Papanicolaou's technique.

CYTOLOGICAL STAINING

Touch smear and brush cytology smears after fixation were stained by hematoxylin and eosin stain. Steps employed are:

Preparation of dyes

Mayer's hematoxylin is used and can be prepared
as given below:

Hematoxylin 1 gm.
Distilled water 1000 ml.
Potassium alum 50 gm.
Sodium iodate 0.2 gm.
Chloral hydrate 50 gm.
Citric acid 1 gm.

Allow hematoxylin, alum and sodium iodate to dissolve overnight. Add chloralhydrate and citric acid and boil the solution for 5 minutes. After this cool the solution and it will be ready for use.

1% alcoholic eosin is used as counterstain and it can be prepared as follows:

Eosin Y water soluble 1 gm.
Distilled water 20 cc.
Dissolved and added 95% alcohol
Staining Technique:

1. The imprints after fixation in ether-alcohol are stained in Meyers hematoxylin for 5-10 minutes.

2. The slides are then rinsed in running tap water and dipped in alkaline water for the purpose of bluing. This takes 1-2 minutes and at the end of it, the imprints appear bright blue in color. The slides are again rinsed briefly in running tap water.

3. The slides are then dipped 4-5 times in 80% ethanol.

4. This was followed by staining with 1% alcoholic eosin solution for 70 seconds to