SPECIAL ARTICLE

UNNECESSARY INVESTIGATION IN MEDICAL PRACTICE

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INTRODUCTION

In today's medical practice, avoiding the pitfall of embarking on unnecessary investigations is difficult because of easy availability from the plethora of laboratory tests, radiological aids and radionuclide studies. Then there are the scanning machines, which now are being manufactured at a greater scale than before and with more and more sophisticated parts.

Constantly, there is a need to be conscious of the objectives of investigations when faced with patient problems. In the main, these are to conduct tests to confirm a diagnosis, to delineate the extent of the disease process, to exclude certain definitive differential diagnosis, to collect basal data and to assess progress of treatment. Different objectives pertain when conducting investigations for research and there may well be instances when investigations are made to test the reproduceability of methods.

At fault may be the patient or the doctor when unnecessary investigations take place. Thus, there is the doctor who, anxious not to miss anything significant, orders a wide investigatory net to be thrown, in the hope of occasionally and to his astonishment. find a diagnostic clue turning up. In this process, however, many tests will emerge as being unnecessary.

When a metastatic lesion has been found, the patient is then subjected to numerous investigations, with the doctor chasing for a "primary" growth. Here, in some cases, a search is therefore made for a possible "primary" in every important organ of the body. Unnecessary investigations will again occur and in some patients, even with investigations completed, the "primary" proves to be elusive.

Turning to the patient, there are several categories who make likely the chance of over-investigation. There is the patient with tremendous anxiety and presents with multifarious problems and questions. The attending doctor then will have to sift the chaff from the grain; otherwise to attend to each problem with separate investigations of different kinds will definitely result in unnecessary investigations. The need is to investigate only what is important.

The second type is the patient with means, who will often than not, suggest that certain investigations be done as costs do not matter. To please such a patient is an easy way out but constantly, unnecessary investigations again will be performed.

The third type is the VIP patient and here, difficulties loom. Certainly, the practitioner will need to exercise care not to miss pathological process and this will lead to the temptation of investigating as widely as possible. On the other hand, the VIP patient and/or his relatives may exert pressure overtly or covertly, subtly or blatantly for certain procedures to be done; alternately, the VIP patient may realise that by making too many suggestions, undue pressure is being exerted and therefore refrain from saying what he should.

The foregoing draws attention to the circumstances when unnecessary investigations can occur. The following are four examples for illustration.

Example A

M.S.G., an Indian male of 48 years, was first examined for the complaint of upper abdominal pain in Sep 78, when a *barium meal* and *oral cholecystographic examination* showed no abnormality. He was treated with antacids, with symptomatic relief.

A relapse of the pain occurred in Nov 79 when he was admitted into hospital for investigations and the following were done:

Investigations	Results	Comment	
1. HB	14.5 gm/dl	Normal	(Unnecessary)
2. WBC & DC	10,000 (P62%)	"	
3. Platelet count	150,000	"	
4. Urine analysis	No albuminuria or sugar		
5. S.amylase	32 units	"	
6. Urine diastase	64 units	Slightly elevated.	
7. B.urea	30 mg/dl	Normal	(Unnecessary)
8. S.creatinine	1.4 mg/dl	"	"
9. S. Na, K Cl		"	"
10. S.albumin	3.9 g/dl	"	"
11. S.globulin	3.0 g/dl	"	"
12. S.bilirubin	0.8 mg/dl	"	"
13. SGOT	24 u/L	"	"
14. SGPT	23 u/L	"	(Doubtful need)
15. 12-lead ECG	No significant changes		
16. Stools for culture	No enteric pathogens or amoeba		(Unnecessary)
17. Fasting B.glucose	91 mg/dl	Normal	

It can be noted that of 17 investigations, 9 were unnecessary and all but one yielded normal results.

A *gastro-duodenoscopic examination* showed scattered areas of inflammation of the duodenal mucosa. After symptomatic treatment, he was discharged from hospital, labelled as suffering from acute duodenitis.

He returned to his general practitioner for further management.

Two years later in Sep 81, there was a recurrence of abdominal pain and he was re-investigated. Peripheral blood counts, MCV and haematocrit (unnecessary) had normal results. Urine analysis showed no abnormality. Estimations of s.bilirubin, s.proteins, s.transaminases, SAP, s.electrolytes, calcium and phosphate were also done (doubtful need as results were all normal). HBsAg and serum alpha foetoprotein also yielded normal results (unnecessary). However, the serum amylase was found to be elevated. After five days of treatment of the foregoing, laboratory investigations were repeated (unncessary). In the space of five days, more than 50 laboratory tests were conducted.

A *repeat oral cholecystographic examination* showed a small filling defect in the fundus, representing a stone or a polyp. This was followed by *ultrasonic examination* of the abdomen, when no abnormality was recorded. A *repeat barium meal examination,* the third, showed normal appearances in the oesophagus, stomach and duodenum. The radiologist noted opacities over the left renal area, commenting that these were consistent with urinary stones. The following week, a *computer tomographic examination* of the abdomen with enhancement, showed a generally enlarged pancreas with hypo-dense areas in the tail, due to necrosis or cystic changes. Calcifications were seen in the body and tail and a diagnosis of chronic pancreatitis was made. This is an example ofthe long investigatory journey taken by a patient in today's medical practice. The route is punctuated by intense and numerous laboratory investigations, radiological aids (both necessary and unnecessary) before reaching a successful diagnostic end.

Comments

This is an example of the difficulties met with in the investigation of upper abdominal pain after negative results from barium meal, cholecystographic and other radiological investigations have excluded common causes.

I can recall an outstanding instance of a Chinese, 52 years (a businessman by occupation), who in a period of 5 days of right hypochondrial pain, had oral cholecystographic, barium meal and IVP examinations, all of which yielded no abnormality and at the end of the week, the vesicles of herpes zoster emerged.

Example B

A.b.S., a Malay male aged 40 years, a lorry driver by occupation, in Nov 81 had two days of fever with headaches. He went to see his doctor who found him afebrile but with an elevated BP of 162/104, whereupon the following investigations were embarked on.

Investigations	Results	Comment	
1. HB	14.5 gm/dl	Normal	(Unnecessary)
2. WBC	12,000 (P63%, L32%)	"	(Doubtful need)
3. S.triglycerides	530 mg/dl	Elevated	(?Fasting)
4. S.cholesterol	400 mg/dl	"	
5. SGOT	53 u/L	Slightly elevated	(Unnecessary)
6. SGPT	75 u/L	"	(Unnecessary)
7. S.Na, K Cl		Normal	
8. SCPK	280 u/L	Slightly elevated	
9. Urine analysis	Albuminuria ++ Sugar +		
10. GTT	Diabetic curve		
11. ESR	45 mm/hr	Elevated	
12. HBsAg	Negative		(Unnecessary)
13. S.alpha foetoprotein	1.0 ng/ml		
14. S.uric acid	9.0 mg/dl	Slightly elevated	(?Significance)

Following these investigations, the patient was referred to a cardiologist for a treadmill stress ECG which produced inconclusive results, because the patient could not complete the test owing to excessive skeletal muscle fatigue.

The reason for ordering an *ultrasonic examination* of the abdomen was uncertain but this showed up the presence of existing silent gall stones and hence a new problem arising from investigation.

Comments

This patient presented with a fever and was investigated for hypertension. The easy availability of certain laboratory tests induced almost automatic ordering. From the point of view of cost-effectiveness, this is on the debit side.

Example C

L.G.T., a Chinese male (63 years) businessman, was referred by a physician in November last year, with the information that he had an "acute exacerbation of his peptic ulcer" of a week's duration. He was given tablets cimetidine, antacids and tranquilisers. A dyspeptic history dated back to about 30 years, with the first complication of melaena in 1973 when he was hospitalised for 12 days and received blood tranfusions.

In 1974, he consulted a gastroenterologist in Australia and was told that he was suffering from liver cirrhosis and peptic ulcer.

In 1975, a *gastro-endoscopic examination* conducted in Tokyo revealed duodenal ulcer, although at that time he had no symptoms.

In 1976, he was investigated in London by a prominent gastroenterologist and hepatologist.

In 1978, in London, *endoscopy* showed duodenal scarring.

In Mar 80, with a recurrence of upper abdominal pain, he was examined in the United States and an ulcer was noted in the posterior wall of the duodenal cap.

Laboratory investigations showed blood uric acid 5.3 mg/dl, serum cholesterol 260 mg/dl and triglycerides 160 mg/dl. Serum electrolytes and creatinine were normal. The total serum protein was 6.9 g/dl, with albumin of 4.5 g/dl. Serum bilirubin and alkaline phosphatase were normal but the SGPT was marginally raised to 49 u/L (normal 9-36). Fasting blood glucose was 93 mg/dl. The ECG showed no ischaemic events.

Peripheral blood counts were normal.

At *gastro-duodenoscopic examination* on 5 Nov 81, the oesophagus and stomach were normal. However, the duodenal bulb showed mild scarring and no ulcer was seen.

Ultrasonic examination of the abdomen showed that the liver was on the small side with a generalised increase in echo amplitude through the liver parenchyma, suggesting cirrhosis. The gall bladder was contracted, thick-walled and showed the presence of a few stones, although the bile ducts were not dilated. There were small cysts in the upper pole of the left kidney. The spleen and pancreas were not enlarged.

The gall stones were confirmed at *oral choecystographic* examination and there were two opacities in the line of the cystic duct. These could have been calculi also.

He requested referral to a consultant in Sydney whereupon on arrival, a CT scan of the abdomen confirmed the stones in the gall bladder with a dilated common duct. Surgical intervention was advised and he is considering it.

Comments.

This is an example of multiple investigations in four major cities of the world, made possible by individual affluence. Here, the fault lies not in us but in the patient, who requires to be doubly assured by repeat examinations of the same procedures.

Example D

T.T.H., a young Chinese male of 30 years, an architect in profession, was referred to a hospital in Sep 81, with the complaints that for the last six months, he was suffering from lethargy, easy fatiguability, discomfort in the centre of the chest, pricking pains with twitching in the muscles of the limbs. There was also the sensation of a block in the throat when eating, for which his own doctor had sent him for a *barium swallow and meal examination,* which showed no lesions. Three months ago, he noted a pain on the left side of the neck and he felt a few small lumps there.

Father died six months ago from acute leukaemia and mother had hypertension. The physical examination was not helpful and some of the multiple complaints required looking into.

All at once, the following investigations were done by his own doctor.

Investigations	Results	Comment	
1. B. glucose	105 mg/dl	Normal	(Unnecessary)
2. B. calcium	9.1 mg/dl	"	
3. Inorganic Phosphates	2.5 mg/dl	"	
4. HDL-cholesterol	68 mg/dl	"	(Unnecessary)
5. B. urea	22 mg/dlq	"	(Unnecessary)
6. Total s.cholesterol	255 mg/dl	Normal	(Unnecessary)
7. S.triglycerides	189 gm/dl	Elevated	(Unnecessary)
8. Total proteins	7.1 gm/dl	Normal	(Unnecessary)
9. Albumin	4.6 gm/dl	"	(Unnecessary)
10. Globulin	2.5 gm/dl	"	(Unnecessary)
11. A/G Ratio	1.8 : 1.0		
12. Bilirubin	0.5 mg/dl	"	(Unnecessary)
13. Alkaline phosphatase	63 mU/ml	"	(Unnecessary)
14. SGOT	30 mU/ml	"	
15. SGPT	28 mU/ml	"	(Unnecessary)
16. T4 (RIA)	8.5 ug/dl	"	
17 S.bicarbonate	25 mmol/L	"	
18. S.potassium	3.7 mmol/L	"	
19. S.sodium	141 mmol/L	"	
20. Chlorides	99 mmol/L	"	
21. Creatinine	1.4 mg/dl	"	
22. Creatinine	6.8 mg/dl	"	
23. VDRL	Negative		
24. RA factor	"		
25. Alpha foetoprotein	7.0 ng/ml	"	

Comments

Many of the above tests were irrelevant and this is an example of indiscriminate investigations because of the lack of clues in the presenting problems of an anxious patient. I think a few important screening laboratory tests would have sufficed. Talking to the patient and psycho-therapeutic propping instead of intensive laboratory investigations would have helped.

Some Guidelines

In deciding on what laboratory tests or other procedures which need to be conducted for any patient, the initial step is a search for clues in the patient's presenting problems. Certain other indications will arise after the physical examination. Certain pointers from the history may require further assessment. From all these, then a careful selection is made as to those which are important and urgent. Such tests are conducted first.

As treatment progresses, the need to repeat some of the previous investigations will arise. Again, careful thought must be given to select only those which are necessary. The chief guiding principle is to investigate along the lines indicated.

Another guideline is to conduct the least harmful investigation first, amongst available alternatives.

Difficulties may arise in the investigation of a patient with significant past illnesses and only relevant and important ones are embarked on.

The load for procedures may be increased also by suggestions from returned results and reports. This occurs when abnormal findings are marginal or doubtful. Thus, a borderline hypo-echoic area in the liver from ultrasonic examination may require angiographic studies for confirmation. Alternately, a CAT scan of the liver may be ordered.

When reports are available, the practitioner will have at hand answers which are normal, doubtful or abnormal. The greatest need then becomes one of careful collation. Interpretation has to be closely correlated to the history and the physical findings, when certain abnormalities turn up unexpectedly. When this happens, the doctor will be divided by accepting that something had been missed or that the report was from another human's failing or a technical error. This is a difficult situation, requiring thinking and discussion between all concerned, the doctor and the investigator.

Multiphasic Health Screening

The use and abuse in investigatory medicine is of special pertinence to multiphasic health screening. The difficulty is in the selection of tests and procedure to be carried out for this purpose. Where the line has to be drawn may be blurred, differing from country to country, determined by availability and limited by costs. Even in the Singapore context, different centres have differing methods.

In this matter, the importance of a careful enquiry into the history and a diligent physical examination cannot be over-emphasised. Certain facts emerging from these two examinations make special investigations more important than the routine ones.

The routine peripheral blood counts, urine analysis and microscopy, x-ray films of the chest and abdomen and a 12-lead ECG form the foundation. An ESR is mandatory. The cancer, cardiovascular and infectious diseases prevalent in Singapore make the following necessar: for women, an examination of the breasts and genital tract and for both women and men, VDRL reaction, HBsAg and serum alpha foetoprotein, liver function tests, a barium meal examination and bronchoscopy. An upper gastroendoscopic examination may also be required. Biochemical examinations include fasting serum high-density and total cholesterol, triglycerides, lipo-protein electrophoresis, electrolytes, urea and creatinine. Blood is grouped and examined for G6PD deficiency.

Is routine imaging of the brain, thorax and abdomen necessary? I think it becomes so only when indicated.

The whole process is both exacting and time consuming and also expensive. It can be contended that it is not prudent for a public institution to undertake multiphasic health screening because of its poor cost-effectiveness and of its utilisation of a time already much needed to attend to emergencies and other clinical areas. It is a voluntary movement and recommended for practice in the private sector.

What is the level of yield from health screening? Certainly, there is an increasing realisation that this is low and that it is wiser for a person with any new symptom to report to a doctor early rather than to wait for an annual check-up. This is supported by published data.

Conclusion

Whilst investigational medicine has been accepted as an integral part of medical practice, this has to be prudently exercised. Unnecessary investigations are definite hazards and detrimental to the interests of patients and doctors. Harmful procedures had best be avoided. Investigate only when indicated.