partially incompetent. Many other authors have reviewed the importance of suction tubes in causing damage to the oesophagus, and all seem to agree that it plays a minor part which may become more significant if oesophageal injury has already occurred. McKeown (1958) in reporting two similar cases made the interesting observation that after gastrectomy in each the Ryle tubes were left in only 72 hours, and strictures developed. He felt that they were the result of regurgitation of alkaline fluid through the Polya type stoma and hence into the oesophagus, and sought to prevent this by converting both to a Billroth type of anastomosis. After the second operation the tubes were left in for five days but the strictures disappeared.

The use of a Ryle tube was not thought to be an important factor here. It is conceivable that prolonged use of a tube could aggravate a pre-existing oesophagitis, but there was no proof of such disease, and use of the tube was very brief.

Infection and Thrombophlebitis from Adjacent Lesions

The relation between benign oesophageal stricture and coincident upper abdominal or thoracic lesions has never been clearly defined. Straus (1950) observed that most cases have in common the presence of a peptic ulcer, and the application of surgical trauma to the stomach or oesophagus. This trauma superimposed on chronic inflammatory disease of the upper abdomen might lead to retrograde thrombophlebitis in the lower oesophagus, and eventually to fibrosis and stricture. He felt that this could be explained anatomically in that the coronary vein drains blood from the stomach and receives tributaries from the lower oesophagus, and the lymphatics are closely allied. Allison (1948) observed that in reflux oesophagitis enlarged lymph nodes are always present around the lower end of the oesophagus, forming quite a large mass. He thought this might be a factor when the stricture is eccentric, especially in young children. Opposed to these theories is the fact that thrombosis cannot be shown microscopically, and also there may not be any coexistent inflammatory process. It is felt, therefore, that while these factors may be active in the pathogenesis, defects of the cardia and pyloric obstruction with vomiting are the most significant points in the aetiology.

Having considered several theories which have been brought forth to explain benign stricture of the oesophagus, it still remains that thousands of people have suffered from pyloric stenosis, but only a few have progressed to oesophageal stricture, with or without hiatus hernia and reflux. Larson *et al.* (1942) have suggested that regurgitation of gastric contents into the oesophagus is a normal process in a high percentage of cases. It appears, then, that other factors still unknown govern the response of the oesophagus to repeated exposure to acid gastric or alkaline jejunal contents.

Summary

Two cases are reported of benign stricture of the oesophagus following gastrectomy for pyloric stenosis. The rarity of this disease after uncomplicated gastrectomy is noted, and in reviewing the literature various aspects of the aetiology are assessed. Defects of the cardia and pyloric obstruction with hypersecretion are thought to be the most important factors, but other unknown forces may be involved.

I thank Mr. E. B. Whittingham for his advice and thoughtful criticism in the preparation of this case report.

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VESICAL HAEMORRHAGE AFTER MEGAVOLTAGE IRRADIATION

BY

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Since the availability of megavoltage therapy in this region an increasing proportion of cases of vesical neoplasm from my surgical practice have been referred for this type of treatment. In general the type of case chosen for megavoltage irradiation has been the extensive papillary or ulcerating tumour regarded as too large for either transvesical diathermy excision with radon-seed implantation or segmental resection, and therefore the treatment has usually been an alternative to total cystectomy. The results have been, in the main, eminently satisfactory, and it is thought that this type of therapy given for selected cases of vesical neoplasm represents a definite advance on previous methods, both surgical and radiotherapeutic.

Among 17 cases treated, however, were four instances of persistent and serious vesical haemorrhage which occurred after the irradiation and which resulted in problems of the utmost difficulty in relation to their surgical management.

It is proposed here to describe these four cases, briefly to consider the cause, to discuss more fully the methods used to control the haemorrhage, and, finally, to formulate some conclusions concerning the management of this complication.

Case 1

A man aged 59 was first seen in hospital on December 14, 1957, because of painless haematuria. I.V.P. revealed a large papilliferous filling defect on the left lateral wall of the bladder, a small diverticulum, and normal pyelograms. Cystoscopy confirmed the presence of a large papillary tumour which looked benign. On January 10, 1958, a transvesical diathermy excision of this tumour, together with three other small seedling growths, was carried out. The tumours appeared to be non-invasive, and the histology was as follows: "The large papilloma measures 6 by 6 by 4.5 cm. There are three much smaller specimens. Histologically, they show considerable nuclear irregularity with numerous mitoses, but no evidence of invasion. The growths should probably be considered as carcinomata and they appear to have been completely removed."

In July, 1958, follow-up cystoscopy revealed the presence of multiple recurrences involving a large area of the bladder mucosa. Megavoltage therapy was given during the last two weeks of July. In November haematuria began; at first this was mild, but on January 7, 1959, the patient was readmitted with gross haematuria and a haemoglobin level of 37%. In spite of blood transfusions, "imferon,"

vitamin K, and bladder wash-outs, the bleeding persisted. Cystoscopy on January 27 revealed little except the impracticability of stopping the bleeding by transvesical diathermy—the bladder contained old blood clot which could not be evacuated even with a Bigelow evacuator, and a clear view was not obtained. Further cystoscopy after the instillation of "trypure" into the bladder was equally useless. Total cystectomy was considered, but the patient was in no way fit enough for such a major operation. It was decided to rely on further blood replacement, combined with bladder irrigations (0.05% chlorhexidine). On February 10 there was a sudden deterioration in the patient's general condition, and in spite of supportive measures he died soon after.

Necropsy revealed that death was caused by left ventricular failure due to cardiac infarction, and it was thought that this was probably aggravated by the long-continued haemorrhage from his carcinoma of the bladder. The bladder itself was full of blood clot, and there was a low sessile growth 3 cm. in diameter occupying the vault of the bladder, with smaller outlying tumours near the right ureteric orifice.

Case 2

A man aged 54 was referred to hospital on July 18, 1958, because of painless haematuria. I.V.P. showed normal pyelograms, but there was a marked irregularity of bladder outline, suggesting an extensive neoplasm. Cystoscopy confirmed the presence of a large sessile neoplasm involving the whole of the left side of the bladder and extending well into the vault. Initial treatment was by megavoltage therapy, which was given in August. In December haematuria began. Cystoscopy on January 2, 1959, showed the neoplasm to be still present but regressing. The site of the haematuria could not be determined, although a clear view was obtained, and it persisted unremittingly in spite of bladder wash-outs with trypure, AgNO₃, and chlorhexidine. Further cystoscopy on January 29 showed definite regression in the size of the tumour, but the haematuria continued. Vitamin K and calcium gluconate were prescribed. The Hb level remained around 70% without transfusion, and the patient was therefore allowed home and kept under observation as an out-patient.

During most of the year 1959 he continued with mild to moderate haematuria, but his Hb level never dropped below 50%. On January 22, 1960, cystoscopy revealed that the main growth had completely disappeared, but there was a recurrence surrounding the internal urinary meatus. A biopsy report stated: "A small segment of inflamed transitional-celled tumour of the bladder, which is rapidly growing but well differentiated. No evidence of invasion in this piece." Total cystectomy was advised and carried out on February 16, the ureters being transplanted into the colon. No special difficulty which could be attributed to the previous irradiation was noted during the cystectomy. The abdomen had to be reopened on February 22 because of small-gut obstruction due to adhesions, but after this he made an excellent recovery and was discharged home on March 12. The removed bladder showed no sign of the original invasive tumour, but there was a ring of sessile growth surrounding the internal urinary meatus and spreading on to the right side. Microscopically it was an undifferentiated carcinoma. Since discharge he has remained well apart from failure to regain his pre-operative weight and energy. Chest x-ray films, however, in January, 1961, revealed two small secondary deposits in the upper lobe of the right lung. He was seen by a thoracic surgeon (Mr. F. R. Edwards), who advised lobectomy on the grounds that these were isolated metastases; but the patient refused further surgery.

He had a mild electrolyte disturbance in February, which responded to intravenous sodium lactate and tube drainage of the rectum. When last seen (October, 1961) he was quite well in spite of the chest secondaries, and the electrolytes were normal.

Case 3

A man aged 47 was referred to hospital on October 7, 1958, because of painless haematuria. I.V.P. showed a large papilliferous filling defect on the left side of the bladder and normal pyelograms. Cystoscopy confirmed the presence of a very large papillary neoplasm involving the whole of the left wall and vault and extending down on to the trigone. Bimanual examination revealed no induration of the bladder base. A biopsy was taken and the report was "transitional-celled papilloma."

Megavoltage therapy was given in November. Cystoscopy on May 9, 1959, showed that the main tumour had completely disappeared. There was a small amount of residual tumour on the left side and on the roof of the bladder, which was regressing.

On June 21 he was readmitted with haematuria and a Hb of 70%. Vesical drainage via an indwelling Foley catheter was instituted and the bladder was washed out with 0.05% chlorhexidine and "trypure novo." The haemorrhage continued and blood was transfused. This conservative regime was followed for the next six weeks, but the haematuria never lessened. Over 20 pints (11.4 litres) of blood were given during this period, and on August 11 his Hb was 30% and it was obvious that he would die if the bleeding was not stopped. The same day both internal iliac arteries were ligated. It was felt, however, unsafe to rely on this alone, so after extraperitoneal ligation of these vessels the bladder was opened. A very small residual area of tumour was found situated above the right ureteric orifice, from which blood was slowly seeping. The whole area was excised with a diathermy loop and the bladder closed. This combined operation stopped the vesical haemorrhage, and undoubtedly saved the patient's life. Histology of the removed specimen was reported on as follows: "An unfixed piece of necrotic tissue showing some calcification around the edge." By September 12 his Hb was 77%, and further blood transfusion had not been required since the operation. The suprapubic wound did not heal, however, and it was resutured on October 23.

On November 9 haematuria recurred, but this was only a mild episode and soon ceased. He was discharged home on December 21 with his suprapubic wound healed, micturating normally, and with no haematuria.

He was readmitted, however, on January 1, 1960, with further haematuria, once again severe. Three pints (1.7 litres) of blood were transfused and the patient was prepared for possible total cystectomy. On account of the previous findings of a near-normal bladder it was decided to open the bladder first to make sure the operation was essential. Owing to previous experience, due to blood clot and poor vision, cystoscopic assessment was considered unreliable. This operation was done on January 22. The bladder appeared normal apart from a small papillomatous area situated on the left side of the bladder away from the previous area of diathermy resection. This small area, not larger than a millet seed, was bleeding continuously. The area was excised with the diathermy loop, cutting deeply, and the bladder closed, drainage being effected by an indwelling Foley catheter passed per urethram. There has since been no further haemorrhage. The suprapubic wound healed and the patient was discharged on February 10, 1960. The removed specimen, however, is reported histologically as transition-celled carcinoma of the bladder. The patient is having regular follow-up cystoscopies at three-monthly intervals. When last examined, in July, 1961, the bladder was quite clear, with no evidence of recurrence of the neoplasm, and there had still been no recurrence of the haemorrhage.

Case 4

A man aged 64 was referred to hospital on August 27, 1958, with painless haematuria. He had been under treatment for pulmonary tuberculosis for several months with

satisfactory progress, but the haematuria had caused his Hb to drop to 34% ; at that time he refused to enter hospital. An I.V.P. showed no evidence of tuberculosis of the urinary tract, both pyelograms being normal, but there was a large basal filling defect in the bladder. Clinically the prostate was not enlarged. Urine culture for tubercle bacilli was negative. At this time he refused cystoscopy, but later agreed, and an examination was done on November 27 after transfusion of several pints of blood. The findings were a very extensive papillary neoplasm with short thick fronds and a sessile base covering both the right and the left walls of the bladder and extending towards the internal meatus. Bimanual examination revealed no palpable induration. A biopsy was taken and the report was as follows: "Section shows a simple papilloma with no obvious malignancy, although the amount of tissue present is small." The tumour was regarded as probably malignant in spite of this report, but not infiltrating deeply. Megavoltage therapy was advised and given in December.

Slight haematuria recurred on May 7, 1959, and cystoscopy revealed an excellent result from the irradiation, the right and left walls of the bladder being quite clear of growth. There were, however, two small papillary areas remaining on the bladder base which were regressing. He remained well until August, when further haematuria recurred and persisted. Perurethral fulguration of the bleeding area was attempted, with no success. Bladder irrigations with 0.05% chlorhexidine, AgNO₃, and trypure were also ineffective. Blood transfusion became necessary and had to be repeated; further, it became obvious that direct surgery would have to be undertaken. On October 1 the bladder was opened; a large blood clot was removed, and a small papillary area about 1 cm. in diameter lateral to the left ureteric orifice was found to be the source of the bleeding; this was excised deeply with the diathermy loop. The remainder of the bladder appeared normal, and, as the bleeding was controlled, the bladder was closed. The patient recovered quickly from this operation, the urine remained crystal-clear, and he was discharged on October 15.

Haematuria recurred, however, on November 16, and continued unremittingly. Once again bladder irrigations and instillations were of no avail. Many pints of blood were transfused during the next six weeks, and cystoscopy showed the bleeding-point to be a very small area situated at the site of the previous diathermy excision. Perurethral fulguration was applied. This controlled the bleeding for three weeks, after which it recurred and persisted. On January 20, 1960, after further blood transfusions, both internal iliac arteries were ligated via an extraperitoneal approach. This had very little effect on the haematuria, which continued, and a further 5 pints (2.8 litres) of blood had to be transfused. On February 11 the bladder was reopened and found to be quite clear of neoplasm. Just lateral to the left ureteric orifice there was a deeply ulcerated area about the size of a large pinhead, which was bleeding freely. The bladder wall surrounding this area was thickened, and it was again possible to excise the area deeply with the diathermy loop. The bladder was closed completely and drained via an indwelling Foley catheter. His wound healed rapidly, and he was discharged on March 2.

On June 28, however, he was readmitted with yet further haematuria, and 2 pints (1.1 litres) of blood were transfused. On cystoscopy, the blood clot was evacuated and the bladder appeared normal. The site of haemorrhage could not be seen. On July 4 the Hb had dropped to 30%, and 3 pints (1.7 litres) of blood were transfused. On further cystoscopy more blood clot was evacuated. On this occasion the bleeding-point was seen above the left ureteric orifice and diathermy was applied. On July 18 he was still bleeding heavily. After further transfusion his bladder was reopened for the third time on July 21, and a small papillary recurrence just above the left ureteric orifice was deeply excised with the diathermy loop, and the edges of the resulting defect were sutured. The bladder was again completely

closed and drained by an indwelling Foley catheter. By August 3 the wound had completely healed, his urine was crystal-clear, his Hb 85%, N.P.N. 26 mg./100 ml., and he was again discharged. The histological report on the specimen removed on July 21 stated: "The tumour is a sessile, papillary tumour of transitional epithelium. No invasion is seen, but mitotic figures and abnormal nuclei are so numerous that there is little doubt that the tumour is malignant." In view of this report it was decided to carry out total cystectomy if further haemorrhage occurred, or if cystoscopy at regular intervals showed any sign of recurrence.

He bled again in January, 1961. A further I.V.P. showed normal pyelographic appearances, and after being prepared for total cystectomy his bladder was reopened on January 5 to assess the local condition prior to performing this operation. Apart from blood clot the only abnormality was a small area of heaped-up epithelium about 0.5 cm. in diameter situated above the left ureteric orifice. It was decided not to do a total cystectomy, and once again a transvesical excision of the bleeding area was performed. On this occasion the histology was as follows: "In paraffin section the appearances are those of a simple papilloma. There is no evident malignant change." Even after this fourth transvesical operation his wound healed quickly, and he was discharged on February 2.

Once again, however, success was only short-lived. He began bleeding again on April 12 and his Hb started to drop. He was transfused and total cystectomy performed on April 28, the ureters being transplanted into the colon. The operation was technically more difficult than usual because of the previous interventions, but nevertheless the patient made an excellent recovery and was discharged home on May 31.

Macroscopically, the removed bladder looked almost normal. The histological report was as follows: "Microscopically there is well-marked cystitis, but neither tumour nor necrosis can be recognized in five paraffin sections from different parts of the bladder. In places the muscle is almost entirely fibrous and contains macrophages and some foreign-body giant cells. In such areas there are a few cells that cannot be identified but which do not seem to be tumour cells."

Irradiation Dosage

The total dose and rate of irradiation given to these four cases was as follows. *Case 1*: 5,090 rads maximum and 4,920 rads minimum in 15 treatments over 21 days. *Case 2*: 5,100 rads maximum and 4,700 rads minimum in 15 treatments over 21 days. *Case 3*: 5,500 rads maximum and 5,000 rads minimum in 15 treatments over 18 days. *Case 4*: 5,500 rads maximum and 5,000 rads minimum in 15 treatments over 22 days.

Discussion

The cause of persistent and severe vesical haemorrhage after megavoltage therapy is to a large extent speculative. There is, however, some evidence that irradiation causes damage to the vesical blood-vessels. Wallace (1954) describes a "necrotizing arteriolitis" as one of the ill-effects of irradiation on the bladder. In this condition the muscle coat of the arterioles is replaced by fibrous tissue and the normal contractility of the arterioles is consequently impaired.

In 1959 Wallace, together with N. R. Mackay and D. W. Smithers, gave the opinion that as a consequence of heavy irradiation the bladder mucosa becomes thin, blanched, atrophic, and inelastic, while the submucosa shows marked fibrosis, tending to split readily and cause persistent bleeding from previously damaged submucosal vessels.

Riches and Windeyer (1960), describing 11 cases of severe vesical bleeding among 91 patients treated by megavoltage therapy, state that in the majority the bleeding came from extensive telangiectases, but in others there was destruction of the mucous membrane, leaving a shaggy hyperaemic surface from which a continuous ooze occurred.

Such telangiectases or shaggy hyperaemic surfaces have not been observed in these four cases, nor has any evidence of necrotizing arteriolitis been found even after re-examination of all the pathological specimens available. In the four cases described here it would appear that the persistent and recurrent haemorrhage has occurred from areas of residual or recurrent tumour formation. The only possible exception to this was the finding of a very circumscribed but deeply ulcerated area causing the bleeding at the second transvesical operation in Case 4. This could conceivably have been due to necrotizing arteriolitis, but unfortunately the specimen was too severely damaged by diathermy for histological examination to be helpful.

It is of course a clinical fact that vesical neoplasms which have not been subjected to irradiation seldom bleed in such a serious and persistent manner. It is difficult to escape the conclusion, therefore, that vesical irradiation can occasionally, by the production of either necrotizing arteriolitis or some other lesion so far undiscovered, so alter the arterioles or capillaries carrying blood to recurrent or residual tumour areas as to allow them to rupture spontaneously and to bleed seriously and unremittingly.

Treatment

When persistent haematuria follows megavoltage therapy the following methods of treatment are available: (1) conservative—that is, bladder wash-outs, haematinics, blood transfusion, vitamin K, etc.; (2) cystoscopic diathermy to the bleeding area; (3) a transvesical attack with diathermy excision of the affected part of the bladder; (4) ligation of the internal iliac vessels; (5) urinary diversion without total cystectomy; and (6) total cystectomy.

Conservative Therapy.—In all cases this has been the first choice of treatment, owing to the fact that in no case was the patient's general condition at all serious to begin with. The immediate treatment has been to insert an indwelling Foley catheter and to wash out the bladder frequently with 0.05% chlorhexidine solution. When the Hb level had dropped below 60%, blood transfusions were given. Attempts were made to disperse intravesical clot with trypure novo solution (pure crystalline trypsin stabilized by the addition of 50 mg. of an inert calcium salt dissolved in 100 ml. of sterile saline). In all cases the object was to get the bladder clear of clot and haemorrhage so that an accurate assessment of the cause of the bleeding could be made at cystoscopy. This objective was seldom attained, and it must be accepted that cystoscopy is often inaccurate in this condition because either of retained blood clot or persistent bleeding. Furthermore, Case 1 has shown that conservative therapy can be persisted with too long.

Cystoscopic Diathermy to Bleeding Area.—This was attempted in Case 4 on two occasions. The first was quite unsuccessful, and on the second occasion the bleeding was controlled for about three weeks. In the

other cases massive blood clot and poor vision rendered this method of controlling the haemorrhage quite impracticable. It is my opinion that cystoscopic diathermy is seldom a practical proposition in these cases. The affected bladder invariably contains blood clot which is difficult to evacuate completely, and in only one of the cases has it been possible to obtain good enough vision to apply the electrode with any degree of precision. In addition it seems doubtful whether it might be effective except in very mild cases. This opinion is supported by the experience of Riches and Windeyer (1960), who state that light diathermy sometimes makes the bleeding worse and deep diathermy may stop it for a time but increases the area of necrosis.

Transvesical Diathermy Excision of Bleeding Area.—This appears to have been a highly effective method for immediate control of the haemorrhage. Unfortunately, however, the success of this method did not usually prove permanent. In Case 4 the operation was carried out four times and eventually had to be followed by total cystectomy. In Case 3 this method was used on two occasions. The first time the bleeding was controlled for five months, and for the 21 months after the second operation there had been no recurrence of bleeding or tumour formation. In both these cases the internal iliac vessels were also ligated. It is difficult to know how much this contributed to the measure of success achieved by the transvesical diathermy excision, but it is my opinion that the arterial ligation made little or no difference.

Ligation of Internal Iliac Vessels.—Schmitt (1953) first proposed this method for vesical haemorrhage and described four cases in which the haemorrhage occurred after prostatectomy. Stapor and Majurek (1957) recommended the ligation as a palliative measure in severe vesical haemorrhage due to inoperable carcinoma of the bladder and described six successful cases. In the above four cases the operation was first used in Case 3, when the patient was severely exsanguinated. It was combined with transvesical excision of the residual neoplastic area with a diathermy loop, and undoubtedly the combined operation was successful. Whether the arterial ligation if performed alone would have been effective or, alternatively, whether the transvesical excision if performed alone would have been effective, is a matter of conjecture. In spite of the ligation the haemorrhage recurred in this case, however, and a further transvesical operation was required before the patient finally recovered. In Case 4 the arterial ligation was unsuccessful and transvesical diathermy excision had to be carried out on three occasions after this, and eventually total cystectomy was required. In each case the operation has been extraperitoneal ligation of both internal iliac vessels close to their origins from the common iliacs. No attempt has been made to place the ligature on the anterior division and no untoward sequelae have occurred.

Urinary Diversion without Total Cystectomy.—I have not used this method. Riches and Windeyer (1960) diverted the urine into an iliac loop in three cases but failed to stop the bleeding, and total cystectomy was required. In a fourth case diversion was combined with ligation of both internal iliac arteries and segmental cystectomy, but even after this bleeding recurred. It would therefore appear that urinary diversion alone is not sufficient to control the haemorrhage. In addition, it seems undesirable to leave a defunctioned bladder

which has been affected by diffuse neoplastic growth even if at the time the growth does appear to have been eradicated.

Total Cystectomy.—Case 2 was treated by this method, the ureters being transplanted into the colon. The removed bladder showed new tumour deposits of undifferentiated carcinoma surrounding the internal meatus. Obviously no lesser operation would have sufficed in this case. Case 4 was also treated by total cystectomy, but only after four operations of transvesical excision and one of extraperitoneal ligation of the internal iliac vessels. The removed bladder showed no histological evidence of residual tumour or of radionecrosis, but the operation had become necessary because of repeated haemorrhage in spite of temporary control by less radical methods.

The prolonged hospitalization and the number of surgical interventions required in these cases illustrate the extreme gravity of anything other than mild haemorrhage after megavoltage therapy. It is not surprising that most surgeons resort to total cystectomy, and this was the treatment required for two of the four cases. It would also appear that total cystectomy would have been the only satisfactory method of controlling the fatal case (Case 1) had the myocardial infarction not occurred, as the necropsy showed multifocal recurrences in the bladder. It may well be that Case 3 would also have been better treated by this method, and certainly for the patient himself the ordeal would have been no greater. One very severe operation may well be preferred to several less major interventions. On the other hand, however, it may fairly be said that the less radical treatment has left him better off than he would have been if total cystectomy had been chosen. He has not bled for over 21 months, and follow-up cystectomy has shown no evidence of recurrence of the tumour and he retains the normal and physiological method of micturition.

Both Cases 3 and 4 illustrate the fact that transvesical excision of the bleeding area can be relied on to control the bleeding for several weeks, if not indefinitely. This is important because it means that total cystectomy need never be resorted to in an exsanguinated or weakened patient. The lesser operation should be chosen first, and, if considered necessary, total cystectomy should be proceeded with when the patient has fully recovered from the effects of the haemorrhage.

Management

With regard to the management of these difficult cases, my experience supports the current surgical opinion that severe and persistent haemorrhage after megavoltage therapy will usually require total cystectomy. Before resorting to this operation, however, a reasonable period of conservative treatment should be given a trial and cystoscopy may well show that the neoplasm has been almost completely eradicated by the irradiation. In many cases, however, extensive blood clot will render cystoscopy a very inaccurate and fruitless procedure. Attempts at clot dispersal with enzyme solutions and a Bigelow evacuator are very likely to fail, and if tried should not be persisted with.

In all cases it may well be worth while opening the bladder and carrying out a transvesical excision of the bleeding area before resorting to total cystectomy. The bleeding-point will often be found to be a small

recurrent neoplastic area and the main tumour may well have completely or almost completely disappeared. This relatively minor operation can be carried out on a patient who is considerably weakened by loss of blood, and, although permanent success seems unlikely, the bleeding will be controlled for several weeks, during which time the patient's Hb level can be rectified at leisure. If, after this, further bleeding recurs it is probably best to proceed with total cystectomy, but this operation should not be performed on a weakened and exsanguinated patient. If necessary a second transvesical excision to regain control of the haemorrhage followed by total cystectomy in 8 to 10 weeks' time is recommended. However, the temptation to persist with lesser operations on account of non-malignancy and very small areas of recurrence as a cause of the bleeding should probably be resisted in most cases.

Summary and Conclusions

Four cases of persistent haemorrhage occurring after megavoltage irradiation for extensive vesical neoplasm are described. This complication after megavoltage therapy is regarded as an extremely serious condition; if it is not controlled by conservative measures within two to three weeks, total cystectomy should be seriously considered, even if cystoscopy shows that the original tumour has almost completely disappeared. Cystoscopic diathermy has not proved practicable, and ligation of the internal iliac arteries is not effective. The bleeding, however, can usually be controlled by transvesical diathermy excision of the bleeding area, and this operation alone, possibly repeated, may suffice in some cases. In others it can be a useful preliminary to total cystectomy, allowing the patient to recover fully from his blood loss.

I am grateful to Dr. M. A. Stewart for providing the irradiation details, and to Mr. J. Humphries, my registrar at the time, for suggesting the internal-iliac-arterial ligation in Case 2. I also thank the nursing staff at Broadgreen and Newsham General Hospitals for their devoted and skilful care of these seriously ill patients.

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At the opening meeting of the Manchester Medical Society Dr. J. F. WILKINSON described his recent tour of Japan and Thailand and discussed the facilities for medical teaching and research in the two countries. He described the Eighth Congress of the International Haematological Society in Tokyo, and gave an account of his tour of other Japanese medical centres, including the cities of Hiroshima and Nagasaki. In Thailand active medical research work was being carried out, though under less easy conditions than in Japan. There was an abundance of interesting clinical material, particularly of a haematological character. There were many cases of chloramphenicol-induced aplastic anaemia and thrombocytopenic purpura, as well as leukaemias, haemolytic anaemias, and haemoglobinopathies, which offered great scope for further clinical and haematological research.