PLATE 2.

By M. LEDERMAN, M.B., B.S., M.R.C.S., L.R.C.P., D.M.R.E. - - CANCER OF THE PENIS

FIG. 1a.—Before Treatment by Radium Applicator.

FIG. 1b.—After Treatment.

FIG. 2a.—Before Teleradium Treatment.

FIG. 2b.—After Treatment.

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CANCER OF THE PENIS.

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Carcinoma of the penis is not a common disease, forming 2 to 5 per cent. of all skin cancers¹ and 2 per cent. of all genito-urinary cancers occurring in men.² Although the incidence of carcinoma of the penis is low it is for this reason a disease of prime interest as its relative rarity often leads to mistakes in diagnosis with dire results. Furthermore, it is an outstanding example of a form of cancer for which effective and simple prophylactic measures exist but which have not as yet received the recognition they merit.

Predisposing Causes and Prevention.

Of the several influences invoked as causative factors in the production of penile cancer, only one, namely, chronic irritation, plays a part of importance. Rarer causes are precancerous conditions such as leukoplakia or erythroplasia of the glans. Paget's disease and Bowen's disease affecting the glans penis are no longer considered precancerous conditions but rather intra-epidermal forms of cancer.³ Syphilitic scars or venereal warts may also prove starting points for an epithelioma.⁴

The importance of long-standing chronic irritation in the production of skin and mucous membrane cancers is well established, e.g., the lip cancer of clay-pipe smokers, and the scrotal cancer occurring in chimney sweeps and mule spinners, etc. In the case of cancer of the penis a chronic irritative process affecting the glans and prepuce follows almost invariably on a phimosis, which acts by allowing the normal secretions to accumulate and stagnate under the tight prepuce, whereby this structure and the glans are subjected to chemical irritation by the breakdown products of the stagnant secretion and often to mechanical irritation by the formation of inspissated smegma concretions.

Wolbarst⁵ has collected evidence which indicates that the practice of circumcision in early life offers a means of reducing the incidence of cancer of the penis to negligible proportions. He stresses the importance of performing the operation in early life if prophylaxis is to be effective, since circumcision performed during adolescent or adult life is not a certain protection against penile cancer "because of the tissue damage already effected." The well-known immunity from this form of cancer shown by Jews and Mahommedans is considered by him to be due to the practice of circumcision in infancy rather than to any racial influence.

In existing circumstances other measures likely to prove of prophylactic value are :—

- (1) Early treatment of precancerous lesions, warts or inflammatory conditions affecting the glans and prepuce.
- (2) The school medical supervision of boys, who should be taught that in addition to "behind the ears and neck" "other regions" require proper and regular ablution.
- (3) Doctors practising obstetrics and pediatrics should be impressed with the importance of early circumcision so that they, in turn, may convince parents of the need for the performance of this simple operation.

Pathology and Clinical Features.

Carcinoma of the penis occurs most commonly between the fifth and seventh decades of life, but it should be remembered that about one-third of the patients are men under fifty years of age.

The large majority of primary malignant neoplasms of the penis are histologically well-differentiated squamous-cell carcinomata with abundant cell nests. Basal-celled carcinoma, melanoma and fibrosarcoma have been recorded but are extremely rare in this situation.

From a descriptive point of view the penis can be sub-divided into the following anatomical regions⁶ :—

- (1) Cutaneous region, comprising the skin of the shaft and the cutaneous aspect of the prepuce.
- (2) Mucosal region, made up by the mucosal surfaces of the glans, frænum, coronal sulcus and prepuce.
- (3) Deep region, formed by the corpora cavernosa and spongiosum.
- (4) Urethral region, formed by the penile urethra and its associated glands.

Urethral cancer forms a separate clinical entity and need not be discussed here. The corpora are rarely primary sites of cancer, and because their fibrous sheath acts as a barrier to the disease their involvement by direct extension occurs late.

The cutaneous region is also a rare primary site. The majority of penile cancers arise, therefore, in the mucosal region of the distal end of the organ. There is much discussion and difference of opinion as to the frequency with which the various mucosal structures provide points of origin of a cancerous growth. In general, it would seem that this frequency decreases in the following order—coronal sulcus, glans, prepuce and frænum; but in an appreciable number of cases the disease when first seen is too advanced to allow of such refinement of observation.

Clinically, two types of lesion are seen: the papillary and the ulcerative. The former tends to form a tumour mass which may involve a large part of the organ without infiltrating deeply, while the latter forms an epitheliomatous ulcer with hard edges which tends to infiltrate the surrounding tissues, sometimes producing extensive destruction of the penis. A third type, predominantly infiltrating in character, is occasionally seen.

Apart from any ætiological significance, the presence of a phimosis affects the clinical picture in the following manner :—

- (1) It prevents the patient noticing the lesion in its early stages.
- (2) As the tumour grows in bulk both normal and abnormal secretions accumulate, infection if not already present supervenes and gives rise to a discharge which may be the first symptom. The infective process may spread and later give rise to an acute balanoposthitis.
- (3) In an attempt to relieve the discomfort resulting from the local inflammation and the tension exerted by the neoplasm growing in a restricted space, the patient sometimes manages to retract the prepuce and induce a paraphimosis.

The symptoms of which patients suffering from cancer of the penis complain depend mainly upon the extent of the local disease and the degree of any existing phimosis. Thus in early cases a sense of discomfort, a "wart" or sore spot, or difficulty in retracting the prepuce may be noted. In the latter cases, a swelling, discharge (occasionally blood-stained) or, more rarely, acute local inflammation or a paraphimosis may cause the patient to seek advice. Urinary symptoms in the absence of meatal obstruction or urethral involvement are rare. Pain is also uncommon in the absence of local sepsis.

Cancer of the penis is a relatively slow growing tumour, and whilst histories of one or two years' duration are not uncommonly obtained, periods of five years are not unknown. Local extension of the disease occurs late; but in the neglected case invasion of the corpora cavernosa and spongiosum occur with the formation of a urethral fistula when part of the penile urethra is affected. The scrotum, testis, prostate, bladder, rectum and pelvic cavity may be involved by direct extension in very late cases. Extension via the lymphatics may occur by permeation and in advanced cases thickened, infiltrated lymphatic vessels may be both visible and palpable extending along the dorsum of the shaft of the penis. Extension by embolism to the inguinal nodes is, however, the more usual mechanism of spread, and the superficial group is the commonest to show involvement clinically. Metastases to the pelvic nodes via the deep lymphatics of the urethra and lymphatic channels accompanying the dorsal vein may also occur.

Although it has been estimated that 75 per cent. of cases of cancer of the penis have palpable inguinal lymph nodes when first seen, there is some doubt as to the frequency with which these nodes owe their enlargement to neoplastic deposits rather than to an infective

adenitis secondary to the sepsis that is nearly always associated with the primary disease. When the differentiation of metastatic lymph nodes from infected ones is based upon clinical appearances it is estimated that 30 to 40 per cent. of enlarged nodes are malignant^{1,2}; but when histological examination of the excised nodes is used as a basis for estimation this incidence drops to 20 to 30 per cent.⁶ As a brief generalisation, it can be accepted that 75 per cent. of patients suffering from cancer of the penis have enlarged inguinal lymph nodes, but in only one-third to one-half of these cases is the enlargement due to metastases. Blood-borne metastases from carcinoma of the penis, although not common, are by no means rare.

Diagnosis.

The chief points concerning diagnosis are well described by Cade,⁷ who states: "The diagnosis is established on the clinical appearance of the lesion, on bacteriological examination for the exclusion of specific infections, and on biopsy. Unless a diagnosis of venereal disease is established beyond a doubt, no case should be kept under observation or treated as a chronic infection unless the prepuce can be fully retracted and the entire glans and corona inspected. In cases where phimosis does not permit of a complete examination a dorsal slit should be done even when no tumour can be felt on palpation, as in such cases infection and œdema render it difficult to palpate an early neoplasm accurately. In all cases of doubt, exploration and biopsy should be carried out."

Treatment.

GENERAL CONSIDERATIONS.

Although radiotherapy has established for itself an important place in the treatment of skin cancer there are certain "mucocutaneous" cancers occurring in the uro-genital area (i.e., cancer of the penis, vulva and anus) concerning which reasonable doubt exists as to the relative part that radiotherapy should assume in their treatment. A review of the literature on the subject of cancer of the penis reveals a lack of unanimity of opinion as to the most desirable therapeutic procedure to be employed. Some writers prefer purely surgical treatment, some primarily radio-therapeutic treatment, utilising surgery as a second string, and, finally, others prefer surgery and radiotherapy in a definite combination.

This divergence of opinion may partly be accounted for by the existence of certain locational and histological features of cancer of the penis which complicate such problems as would normally present themselves for consideration in the radiotherapeutic treatment of skin cancer. These special features are as follow:—

- (1) The skin and mucous membrane forming the fold of the prepuce and covering the glans appears to be much more susceptible to damage by radiation than similar tissues found elsewhere.
- (2) The majority of epitheliomata of the penis are infected, and histologically well-differentiated and keratinizing in type, both factors tending to radioresistance.
- (3) Lymph node metastases, not uncommon and often bilateral, respond badly to radiotherapeutic treatment because they, too, contain the same type of radioresistant cell associated with infection.

The absence of any agreement as to the best way of dealing with the inguinal lymph node regions is perhaps the chief reason why no uniform and generally acceptable technique of treatment of cancer of the penis is as yet available.

Of the two methods of treatment employed—namely, surgery and radiotherapy—the latter in the case of the primary disease presents certain definite advantages:—

- (1) The patient is spared a mutilating operation and thus safeguarded against the psychological sequelæ that can follow an operation of this nature.
- (2) If the radiotherapeutic treatment fails, surgical removal is still possible without materially diminishing the patient's ultimate chance of cure.^{2,8}

The contra-indications to radiotherapy are:—^{7,9,10}

- (i) Localised disease in elderly patients—who, as a rule, do not tolerate irradiation well.
- (ii) When the growth is of a predominantly infiltrating type.
- (iii) Advanced local disease, in particular when the corpus spongiosum and urethra or corpora cavernosa are involved.

In the case of the inguinal metastases, however, radiotherapy is at the double disadvantage that not only as already mentioned are these metastatic nodes infected and contain cells of radioresistant type, but the skin of the groins withstands radiation badly, partly because of the normal warmth and moistness of this region. This local peculiarity of the skin acts as a limiting factor to the quantity of radiation that can be given in any particular case, and this limited quantity unfortunately bears no direct relationship to that which may be required to sterilise well-differentiated squamous carcinoma deposits. Furthermore, should irradiation to the limits of skin tolerance not prove successful, any subsequent surgical intervention is made technically much more difficult because of the changes in the skin and subcutaneous tissues induced by the radiation.

Treatment of the primary disease will be considered separately from that of the inguinal lymph node areas since the problems of treatment differ. Each region can be treated by surgery, radiotherapy or by a combination of both methods.

TREATMENT OF THE PENIS.

A. Surgery.

Until about twenty-five years ago the treatment of cancer of the penis was entirely surgical. The gradual evolution of efficient and successful methods of radiotherapeutic treatment has been followed by increasing reliance upon the latter. The surgical operations devised at different times are numerous and vary from local excision of the neoplasm to complete emasculation of the patient, depending on the extent of the disease. Partial amputation and radical amputation are possibly the commonest operations performed,⁶ but in view of the nature of the mutilation following on the latter operation the advisability of emasculation of the patient has to be considered in each case.¹¹

Diathermy coagulation has been successfully employed in the treatment of localised lesions by some writers.¹²

B. Radiotherapy.

Radiotherapeutic treatment may be given in the form of radium or X-ray therapy. Whichever method is employed, there are, as a rule, two problems requiring solution before treatment can be commenced. These problems are introduced by the presence of the prepuce and infection of the neoplasm.

Some form of operation on the prepuce, either a dorsal slit or circumcision, is an essential preliminary in all cases for the following reasons:—

- (1) A complete exposure of the neoplasm must be effected, in order that its extent may be estimated and its response to the treatment readily observed.
- (2) Phimosis of some degree is present in 75 to 85 per cent. of cases,^{13,14} and, even when this is not so initially, the occurrence of local reactionary oedema during the course of treatment almost inevitably brings it about. In the presence of phimosis the proper inspection and toilet of the part becomes very difficult.

If the prepuce is involved by the disease a dorsal slit can be performed, the diathermy knife being used when neoplasm has to be incised. If the prepuce is uninvolved, a circumcision can be performed if the risk of sepsis in the operation field is small. Circumcision is advisable whenever possible, as the subsequent cosmetic result is better than if a dorsal slit alone is performed. It should be noted, however, that in the majority of cases in which a dorsal slit has been performed at the outset some form of circumcision is usually possible after healing of the disease is complete. Local sepsis, unless very marked, rarely warrants any delay in the commencement of the treatment.

Radiotherapeutic Methods of Treatment.

(1) Surface Application of Radium.¹⁵

In this method the penis is placed in a cylinder made of some firm, light, non-metallic material, such as sorbo rubber, columbia paste (mixture of paraffin wax, beeswax and sawdust) or cork. The cylinder should be about 1 cm. thick, and long enough to cover the penis for its whole length. Radium tubes are placed on the outer surface of the cylinder and the apparatus is worn for 8 to 10 hours per day, the treatment being spread over 7 to 14 days. Special care has to be exercised in protecting the scrotum and its contents from irradiation.

(2) Interstitial Radium.

This forms a simple and effective means of treating localised, non-infiltrating lesions. Radium needles or radon seeds can be used and should be arranged according to a definite plan, such as is advocated by Paterson and Parker.¹⁶ Treatment usually lasts seven days.

(3) Teleradium.

Recently a method of treating cancer of the penis by a teleradium unit or "radium bomb" has been described.¹⁷

(4) X-radiation.

For superficial lesions soft X-radiation such as is obtained from an apparatus operating at "low voltages," e.g. 60 k.V. (Chaoul therapy) or 100 k.V. (superficial therapy), can be used. Very occasionally a more penetrating radiation may be required for a bulky or extensively infiltrating lesion, and for this purpose a 200 k.V. apparatus (high voltage therapy) can be employed.

C. Combined Methods.

A combined radio-surgical treatment was used by Dean² for tumours which measured more than 2 cms. in diameter, the penis being amputated $1\frac{1}{2}$ cm. from the disease after radium treatment. Post-operative radiation is sometimes indicated after removal of an extensively diseased organ. If a recurrence of the primary disease or necrosis of the penis occurs after radiotherapy, an amputation becomes necessary, but in neither of these last instances does the treatment represent a strictly premeditated "combination" of methods.

Dosage.

Each of these radiotherapeutic methods has its own particular indications, but, on the whole, surface radium application is the most widely practised method. Irrespective of the particular technical means employed, there is reason to believe that doses of radiation of the same order as are employed for skin epitheliomata are also effective for penile cancer. Generally speaking, 5,000–6,000r is a common dose, but it must be emphasised that there is no hard and fast rule about dosage and each case should be judged on its own merits.

TREATMENT OF INGUINAL LYMPH NODE REGIONS.**A. Surgery.**

This usually takes the form of a block dissection which should for preference be bilateral. If the primary disease is treated surgically the lymph node areas can be dealt with either at the same time or subsequently, depending on the general and local condition of the patient and the preference of the surgeon. The advantages of a two-stage operation are that after the treatment of the infected primary tumour the enlarged nodes, if septic, may disappear, and should this occur the subsequent inguinal dissection is easier and more likely to be followed by uneventful healing. Furthermore, in some cases the operation can be postponed indefinitely and an expectant attitude adopted.^{2,9,18}

B. Radiotherapy.

High voltage X-ray therapy or teleradium treatment are usually employed. The former is the most widely practised, partly because teleradium units are not commonly available. Some authors maintain that teleradium treatment is the better method.^{7,9}

Treatment of lymph node metastases by interstitial radium alone has not given good results and should not be employed as a primary method of treatment. Similarly, the treatment of lymph node metastases by large sorbo rubber or columbia paste radium plaques is not to be advocated as a primary method.

Dosage.

As has already been mentioned, the unfavourable manner in which the skin of the inguinal regions withstands irradiation limits the dose that can be given. With suitable technique and apparatus, as well as efficient nursing, doses of the order of 4,500–5,500r can be delivered to the skin of the inguinal regions. Although this usually results in the breaking down of the surface layers of the skin (moist desquamation), should circumstances justify it, still larger doses can be given, in which event the risk of delayed healing or subsequent radio-necrosis must be taken.

C. Combined Methods.

Methods utilizing both surgery and radiotherapy find their greatest application in the treatment of the lymph node areas. Surgical excision of lymph nodes may be associated with pre- and/or post-operative irradiation. Alternatively, irradiation can be used as a first method and excision practised on any residual tumour tissue. Mention should be made of a further aspect of this combined method, namely, that the primary disease can be treated by radiotherapy and the lymph node areas by surgery or vice-versa.

A review of the methods employed for the treatment of the inguinal lymph node areas leads to the inescapable conclusion that not one of them has sufficiently proved its worth to merit universal adoption. The following survey represents the present position with reference to the conduct of the treatment of the inguinal lymph node areas.

(1) *If the nodes are fixed and inoperable :*

Radiation should be undertaken with palliation in view. If the nodes become operable as a result of the treatment and the primary disease is controlled, surgical dissection may be considered.

(2) *If the nodes are palpable and operable.*

A combination of radiotherapy and surgery is usually indicated. The radiotherapeutic treatment should precede the surgical for the following reasons :—

- (a) The nodes may prove radiosensitive and disappear, rendering any other treatment unnecessary.
- (b) As over 50 per cent. of palpable inguinal nodes associated with this disease are septic in origin, the nodes may disappear as a result of the resolution of the inflammatory process.
- (c) When the nodes prove radioresistant the radiotherapeutic treatment can be regarded as pre-operative in nature and the dosage modified accordingly so as not to delay unduly the time of operation or wound-healing.

(3) *If there are no clinically palpable nodes.*

These are the most difficult cases of all and the problem can be approached in two ways :—

- (a) An expectant policy can be adopted, the patient being examined carefully at regular intervals and treatment instituted only if metastases become clinically demonstrable. This method, which should be used with discretion, finds its greatest application in the case of elderly patients or patients with very early lesions. Should the patient be below the age of sixty or should histological examination show the tumour to be of an anaplastic squamous-cell type or a differentiated squamous carcinoma with few cell nests, some form of treatment should be given to the inguinal areas.
- (b) An active policy can be adopted and treatment undertaken on the assumption that microscopical metastases are in all probability present. The purpose of the treatment is curative and in no way prophylactic in the accepted sense of the word. Whether the treatment employed should be primarily surgical or radiotherapeutic remains an open question.

Surgery has the positive advantage in that the offending tissue is removed, but the operative mortality following bilateral block dissection of the groins is about 20 per cent.^{2,18} and even then there is no guarantee against the occurrence of metastasis in any lymph node tissue accidentally left behind or recurrences in the operation scar. To avoid these last untoward events it is rational to employ post-operative radiotherapy for those cases in which microscopical examination of the excised tissue demonstrates the presence of metastases. It is significant that when metastases are histologically demonstrable in the excised tissue there are very few five-year survivals after block dissection.¹⁹

Taking into account the mortality of the operation, its poor end-results and the fact that its use must be restricted to patients in good general condition, radiotherapy would seem to possess certain advantages, even though its end-results are little better than those of surgery.

Thus radiotherapeutic treatment is a non-operative procedure suitable for nearly all cases, and, should it fail and metastases become clinically demonstrable, surgical excision is still possible or, as second best, interstitial radium methods can be used.

Results of Treatment.

Whereas in discussing methods of treatment it was advisable to consider the treatment of the primary disease separately from that of the lymph node areas, in considering the results of treatment such differentiation is purposeless.

Before the advent of radiotherapeutic methods surgery was the only method of treatment available, with the result that a reasonably large body of surgical statistics is available. As radiotherapy became more widely used so its limitations became more apparent, and there are consequently no large series of published cases in which radiotherapy has been the sole method of treatment. Of recent years most of the published results are those obtained by combined methods, in some of which radical surgery plays the predominant part and in others radiotherapy.

Two points should be noted with regard to the figures given below :—

- (1) Four or five-year survival figures have been quoted wherever possible, as freedom from symptoms for less than this period is no indication of the efficiency of any treatment method. Cancer of the penis is a slowly progressing disease and if left untreated a certain number of patients still survive for five years or more. Thus, Bowing and Fricke²⁰ of the Mayo Clinic observed two survivals for more than five years in a series of thirty-three untreated cases.
- (2) Percentage five-year survival rates cannot be ascertained from many published papers because of the manner of presentation of the figures. To obtain this percentage the relation between the number of five-year survivals and the number of cases observed for five years or more after treatment should be used as the basis for calculation. As these latter figures are rarely given, the five-year survivals in the following account of results of treatment are quoted in relation to the total number of cases comprising the series, this total including all the cases treated, whatever the period of observation. In view of this fact, it is unwise to attach too much significance to the figures given, although they can be regarded as an indication of the comparative efficiency of particular methods.

A. Surgical Treatment.

The largest series of cases come mainly from America. Thus, of seventy-one cases treated by Barney¹⁴ by amputation, with removal of inguinal nodes in some cases, twenty-seven survived more than two years. Colby and Smith²¹ divided their series of fifty cases into two groups. Of the first group, consisting of twenty-six cases of low malignancy, six remained free from disease for more than five years after amputation, and only two of the second group, comprising twenty-four cases of high malignancy, lived for more than five years after amputation and excision of the inguinal lymph nodes. Thirty-four of a series of sixty-seven cases published by Leighton²² were treated surgically and twenty bilateral lymph node dissections were performed. Thirteen patients lived from four to twenty-five years after the operation. Lewis,¹³ employing radical surgical methods, reported fifteen patients out of thirty-four alive over a period of one and a half to sixteen years. Of a group of forty-five "traced" patients surgically treated at the Mayo Clinic²⁰ between 1907–32, fifteen lived for five years or more after treatment.

B. Combined Radio-surgical Treatment.

Amputation of the penis in association with irradiation of the inguinal node areas, whether nodes are palpable or not, is advocated by Hansson⁹ of Stockholm. If palpable nodes do not disappear as a result of the treatment, excision is performed. Of forty-six cases treated, nineteen of whom had lymph node metastases, thirty survived five years or more. Eleven of a series of thirty-seven cases reported by Horn and Nesbitt²⁴ were treated by radical amputation of the penis and radiotherapy to the inguinal node areas. Four of these patients lived five years or more after treatment. In the Mayo Clinic report of Bowing and Fricke,²⁰ of forty-six "traced" patients quoted as having surgical and radiotherapeutic treatment, thirteen lived for five years or more after treatment. No indication, however, is given of the manner in which the two methods were employed.

Dean,² of the Memorial Hospital, New York, has reported on a series of 103 treated cases which he divides into three groups. In Group I he placed all tumours less than 2 cms. in diameter, not accompanied by metastases. Treatment by surface application or interstitial radon was employed for the primary, the inguinal areas were not treated unless metastases developed. Of twelve patients treated in this manner five survived five years or more. Group II comprised all tumours of infiltrating type or of dimensions greater than 2 cms. diameter, unaccompanied by metastases. Radon treatment, followed by partial amputation, was employed and an expectant policy was adopted for the inguinal node regions. Of fifty-one patients in this group, eighteen survived five years or more. In Group III were all tumours accompanied by metastases. The primary disease was treated as for Group II and block dissection performed for the metastases six to eight weeks afterwards. Of forty patients in this group there were no five-year survivals, two patients survived nineteen and thirty-three months respectively, and in both cases radon seeds had been inserted into the site of the metastases after their removal.

In this country the largest series has been reported by Cade.²⁵ Fifty-one cases were treated by interstitial radium to the primary and for the lymph node areas the following principles were advocated :—

- (1) No clinically palpable nodes—expectant treatment or operation.
- (2) Palpable and operable glands—external radiation, followed by excision if the nodes do not disappear.
- (3) Inoperable nodes—telerradium treatment for preference.

Of forty-six patients in this series who were traced, twenty survived free from symptoms for five years or more.

Windeyer²⁶ has reported a series of twenty-one cases in which the primary was treated by interstitial or surface application of radium. Ten patients were alive and well after four years; two amputations were performed for post-radium necrosis. Surgical excision of metastases and observation of the cases in which no metastases were demonstrable was recommended.

Paterson⁸ reported fourteen cases treated by surface application of radium, with eight survivals for more than five years. Five post-radium amputations were necessary. The condition of the inguinal nodes was not mentioned.

The writer¹⁷ has reported a series of twenty-eight cases treated at the Royal Cancer Hospital mainly by radium therapy. The primary disease was treated in all cases by radium, either in the form of surface application, telerradium or interstitial radium. Seven post-radium amputations were performed. The inguinal regions, with seven exceptions, were treated by telerradium whether nodes were palpable or not. Of the seven exceptions, five cases received no treatment and two were treated by block dissection. Thirteen patients were observed for a period of five years or more and seven of them were symptom free for this period. Of these seven cases, five had palpable inguinal nodes when first seen. The nodes were treated by telerradium in four cases and block dissection in the fifth, in the remaining two cases without palpable nodes the inguinal regions were not treated at all.

Summary and Conclusions.

(1) Cancer of the penis is largely a preventable disease. Universal circumcision in infancy would probably reduce its incidence to a negligible quantity.

(2) The commonest site of cancer of the penis is the distal end of the organ and the commonest histological type of growth is a well-differentiated squamous-cell carcinoma.

(3) Palpable inguinal lymph nodes (often bilateral) are found in 75 per cent. of cases; but the nodes are the site of metastases in only one-third to one-half of this number—i.e., in over half the cases the lymph nodes are inflammatory in origin.

(4) The curative treatment of cancer of the penis requires consideration of two separate problems—one presented by the treatment of the primary disease of the penis and the other by the presence, or possible presence, of inguinal lymph node metastases. If metastases to the intra-pelvic lymph nodes or distant organs has occurred any treatment given can only be of a palliative nature.

(5) For the primary disease the advantages of radiotherapeutic treatment are such that it should be given preference whenever possible, due regard being given to certain definite contra-indications. Radium is the commonest radiotherapeutic agent employed and can be used in the form of a surface applicator or interstitially. Recently telerradium (radium "bomb") treatment has been employed with promising results.

(6) Inguinal lymph node metastases, if inoperable, should be treated radiotherapeutically; but there is no general agreement on the best method of treatment of operable lymph nodes or the course to be followed when there are no clinically palpable nodes.

The following would appear to be a rational way of dealing with these cases:

(a) If palpable and operable nodes are present, radiotherapeutic treatment should be tried first with surgical dissection kept as a "second line of defence." High voltage X-ray therapy is the commonest form of radiotherapeutic treatment employed, but telerradium treatment, if available, should be used for preference.

(b) No palpable nodes present—No treatment, the patient being examined regularly and carefully, is justifiable when the patient is elderly or the tumour small (less than 2 cms. in diameter) and histologically a well differentiated and keratinizing squamous-cell carcinoma. In all other cases treatment should be given following the principles indicated for palpable and operable nodes—the assumption being that microscopic metastases are present.

(7) The results of treatment indicate that in early cases, where the primary disease is localised and no palpable inguinal lymph nodes are detectable, the outlook is good—50 to 60 per cent. of five-year survivals can be anticipated with confidence; 85 per cent. of five-year survivals representing the best result obtained.⁹ The primary disease is curable by radiotherapy or surgery if the lesion is reasonably early, but correct radiotherapeutic treatment offers the patient cure without mutilation or gross impairment of function of the organ. It is difficult to assess at an exact figure the results obtained once lymph nodes metastases are definitely present. It is certain, however, that if the nodes are fixed and inoperable the patient is doomed, although radiotherapy can do much to ease his lot. It is equally certain that even when nodes are operable the chances of the patient's survival for five years are much diminished.

(8) Finally it should be stressed that no one method of treatment is likely to prove satisfactory for all cases. Surgery and radiotherapy should be regarded as complementary agents, as in this way only are the best results likely to be obtained.

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