Herrnheiser, Gustav: Anatomic-roentgenological Analysis of the Normal Hilar Shadow, Am. J. Roentgenol., 48:595, 1942.

Judd, Archibald R.: Diseases of the Chest: Diagnosis and Treatment, Philadelphia, F. A. Davis Co., 1947.

Kramer, R. and Glass, A.: Bronchoscopic Localization of Lung Abscess, Ann. Otol., Rhin, and Laryng., 41:1210, 1932.

Latraverse, V.: Interpretation et Terminologie de la Segmentation Bronchopulmonaire, Bulletin de l'Association des Medecins de Langue Francaise du Canada, 75:1, 1946.

Levitin, Joseph and Brunn, Harold: Study of Lower Lobe of Lung; Explanation of Roentgenologic Shadows, Arch. Int. Med., 57:649, 1936.

Lucien, M. and Weber, P.: La Systematisation Pulmonaire chez l'Homme, Arch. d'Anat., d'Histol, et d'Embryol., 21:109, 1936.

Neil, J. Hardie, Gilmour, W. and Gwyne, F. J.: The Anatomy of the Bronchial Tree, Brit. Med. J., 1:495, 1939.

Nelson, H. P.: Postural Drainage of the Lungs, Brit. Med. J., 2:251, 1934.

Overholt, Richard H. and Langer, Lazaro: A New Technique for Pulmonary Segmental Resection, Surg., Gyn. and Obs., 84:257, 1947.

Peirce, Carleton B. and Stocking, Bruce W.: The Roentgenological Anatomy of the Chest. II. The Bronchial Distribution, Amer. Rev. Tuberc., 39:516, 1939.

Rigler, Leo G.: The Chest. A Handbook of Roentgen Diagnosis, Chicago, Year Book Publishers, Inc., 1946.

Rubin, Eli H.: Diseases of the Chest with Emphasis on X-Ray Diagnosis. The Principles of Surgical Treatment, by Morris Rubin, Philadelphia, Saunders, 1947.

Westermark, Nils: On Bronchostenosis, A Roentgenological Study, Acta Radiolog., 19:285, 1938.

Treatment of Yaws in the Haitian Peasant*

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HAITI, the second smallest of the twenty-two Latin-American republics, won its independence from France in 1804, thereby founding the second free state in the Western hemisphere, and the first independent Negro state in the modern world. In an area of ten thousand square miles, inhabited by approximately three million people, there are less than 5000 Caucasians. Although Haiti ranks thirteenth in population, it is first in density of population in the entire Western Hemisphere. The health of the Haitian people is constantly threatened by a triad of diseases, malaria, hookworm and yaws. Of these, yaws is the most virulent and the commonest and was probably brought over from Africa as early as 1509. When this disease is untreated, it produces crippling and loathsome disfigurement of its victims. Although the entire West Indies group of islands have endemic yaws, it is estimated that in Haiti alone, approximately 80 percent of the rural population is infected with this disease. Yet in spite of the proximity of Haiti to the United States, yaws is rarely encountered in this country. This may be due to a number of factors: 1) Immigration from Haiti is exceedingly low, approximately 200 immigrants from Haiti were admitted to the United States in 1947. This does not include transient visitors. However, yaws is most prevalent among the Haitian peasants and they seldom leave their own country because of their limited financial status. 2) The United States Public Health Service requires the Master of any incoming vessel or airplane to report to the proper authorities any immigrant who has a cutaneous eruption or fever. Furthermore, all immigrants are subjected to a physical examination prior to entry into this country. In this way most infected individuals would be detected and detained. 3) It is the opinion of most observers that the temperate climate of the United States is not conducive for the propagation of yaws. Even if some individuals with this disease escaped detection and were admitted to this country it is quite possible that the active manifestations would subside without specific therapy and thus minimize its further spread.

There have been a few reports of cases of yaws in this country and in 1922 Fox[1] reported on the prevalence of this treponemal disease in the United States. He reviewed all of the previously reported cases and was of the opinion that the condition was present in the southern states prior to the Civil War. Since 1922 there have been additional reports in the literature of yaws in the

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TABLE 1

Authors	*Patients Treated*	*Dosage Schedule*	*Clinical Cures*	*Seaologic Results*
Whitehall and Austrian (1944-1945) 2a	41	15,000 *g* 4h x 5-6 days T.D.—500,000 O.U.	One week	None seronegative at end of 20 weeks
Lofgren (1944) 2b	1	1.5 million O.U. in 12 days	13 days	Kahn test negative after 5 weeks
DaCunha, Leao, Guiamras and Cardosa (1944) 2c	7	9,600?52,000 O.U.	14 days	Wassermann test negative in all cases in 60 days
DaGunha and Leao (1945) 2d	5	9,600?52,000 O.U.	14 days	Wassermann test negative in all cases in 60 days
Findlay, Hill and Macpherson (1944) 2e	24	50,000 to 100,000 O.U. in 12 to 24 hours	6-7 days	Two primary cases became negative (Kahn) in 7 days
Thompsett and Kauer (1945) 2f	5	250,000 to 400,000 O.U. in 1-4 days	1-3 days	Not done
Dwinelle, Rein, Sternberg and Sheldon (1946) 2g	500		Within one month	10% became seronegative at the end of 6 months with the Kahn test
Guimaraes (1945) 2h	6	200 O.U. *g* 4h to 9,600 O.U. daily. Period of treatment 20 days — 7 months, 18 days. T.D.-48,000-558,000 O.U.	2 to 7 months; bone lesions not completely cured	Only 1 case reported; Wassermann reaction negative after two months
Stubenford (1946) 2i	1	20,000 O.U. *g* 3 hrs. T.D.-1,500,000 O.U.	15 days	No essential change in Kahn reaction after 5 months
Hill, Findlay and Macpherson (1946) 2j	128	100,000 O.D. daily; T.D.-at least 1,000,000 O.U.	Primary, 9 days; secondary, 8½ days; tertiary, up to 16½ days with two failures.	Seronegativity obtained in 1 case at end of 3 months; in 5 at end of 6 months; in 13 at end of 9 months; in 1 at end of 12 months

United States by Alderson and Coe[2], Fox[3], Cady and Engman[4], Hogan[5], Schamberg and Wright[6], and Dwinelle[7]. A few months ago, Post and Sheard[8] in an excellent and detailed presentation, reported on a case of yaws in New York City. The patient was a 14 year old Negro boy, born in the United States, who was sent to Martinique at the age of one year and who returned to New York in August 1947 with active clinical yaws.

It is also of interest to note that yaws is not limited to Negroes. There have been several reports of this disease occurring in white individuals of the armed forces serving in endemic areas during World War II[9, 10, 11, 12]. Furthermore, approximately 18 percent of 30,000 cases in Brazil and 50 percent of 500 cases in Cuba occurred among white persons. Undoubtedly, many unreported cases have appeared in the southern parts of the United States and many others were probably misdiagnosed and treated as rupial or frambesiform syphilis.

Yaws is an ancient primitive disease of man which probably spread from its origin in Africa. As people became more civilized and hygienic measures were improved, the primitive and transitional forms of this disease by non-venereal contact were screened out and the opportunities for sexual transmission proportionately decreased. It required centuries for this primitive disease to emerge to its present form which is now recognized as syphilis.

The disease occurs most commonly through abrasions in the skin by direct contact with an individual affected with yaws. Direct transmission by insects may also be an important factor, since the avidity with which the flies and fleas feed on yaws lesions have frequently been noted. The organisms have been found in the anterior gut, esophageal diverticulum or stomach of the fly where they may survive for about seven hours. It is possible that yaws is transmitted by regurgitation of an infected "vomit drop" when the in-

TABLE 2

Age Groups	*5 Years and Under*	*6-12 Years*	*13-16 Years*	*17 Years and Over*	*Total*
GROUP A	13	60	41	86	200
Total dosage penicillin in 4 days	1,200,000 O.U.	1,200,000 O.U.	1,200,000 O.U.	1,200,000 O.U.	
GROUP B	0	74	27	50	151
Total dosage penicillin in 2 days	O.U.	600,000 O.U.	900,000 O.U.	1,200,000 O.U.	
GROUP C	0	56	35	58	149
Total dosage penicillin in 1 day	O.U.	600,000 O.U.	900,000 O.U.	1,200,000 O.U.	
Total number patients	13	190	103	194	500

TABLE 3

Groups	*Serologic Cure*	*Serologic Improvement*	*Serologic Relapse*	*Serologic Fastness*
A	25.1%	68.7%	4.6%	1.5%
B	11.0%	81.9%	5.5%	1.5%
B	6.4%	86.4%	4.8%	2.4%

Groups	*Serologic Cure and Improvement*
A	93.8%
B	92.9%
C	92.8%

fected insect feeds on an abrasion or ulceration of a previously non-infected individual.

Soon after Mahoney, Arnold and Harris[13] demonstrated the efficacy of penicillin therapy in early syphilis, reports appeared in the literature attesting to a similar beneficial role in the treatment of yaws. The earlier[14] publications indicated rapid clinical cures with relatively small doses of penicillin but only a few patients attained seronegativity with the tests they employed. In a preliminary report[15] the short term results of treatment of 500 patients with early yaws infections in Haiti was discussed. Penicillin was found to hold definite promise as a therapeutic agent, but the serologic response at the end of three and six month intervals was surprisingly disappointing. The present report deals in detail with evaluation of the results obtained in the entire group treated at the end of 12 months' observations.

TREATMENT SCHEDULES

Five hundred patients with primary and secondary yaws were selected for this study and divided into three groups: (Table 11)

Group A. Two hundred patients were hospitalized and given 1.2 O.U. of sodium penicillin in aqueous solution over a 4 day period (30 intramuscular injections of 40,000 O.U. every three hours, day and night). All patients regardless of age received the same dose.

Group B. One hundred and fifty-one patients were treated on a *two-day* ambulatory schedule, with amorphous calcium penicillin in peanut oil and beeswax (POB) as devised by Romansky[16] (300,000 O.U. per cc.). The dose was reduced for children according to age and weight. Children 6 to 12 years of age received 600,000 O.U., those 17 years and older were given 1.2 million O.U. The penicillin was given intramuscularly in divided doses 24 hours apart.

Group C. One hundred and forty-nine patients were treated on a *one day* ambulatory schedule with the same amorphous calcium penicillin in peanut oil and beeswax. The same dose modification according to age was employed as in Group B, but the doses were administered 10 to 12 hours apart.

CLINICAL RESULTS

Clinical improvement was rapid and remarkable; joint pains disappeared in from 24 to 48 hours; plantar and palmar "crab" lesions became painless in from 48 to 72 hours; primary and secondary lesions were in the desiccation stage in four days at which time the crusts could be easily removed, revealing a dry and well-healed underlying skin. Complete healing of all lesions was observed in most instances on the first re-examination, one or three months following completion of therapy. No toxic reactions from the penicillin therapy were observed, although approximately one-half of the patients in the hospitalized group showed a temporary rise in temperature (100° to

104° F) shortly after institution of therapy. Darkfield examinations gave negative results in from 8 to 10 hours. Stained sections made from biopsy material showed numerous spirochaetes up to 12 hours, only an occasional isolated spirochaete from 12 to 22 hours and none thereafter.

SEROLOGIC RESULTS

Each patient was subjected to a serologic examination immediately prior to therapy and at one to three month intervals following therapy, for at least one year. Although each serum was examined by a battery of six serologic tests, in this report the results reported are limited to those obtained with the Kahn standard and quantitative tests.

In order to evaluate the serologic results obtained in these cases in a 12 month follow-up period, the following arbitrary criteria and definitions were decided upon:

Serologic Cure — Seronegativity attained and maintained following therapy.

Serologic Improvement — A reduction in serologic titer indicating a satisfactory serologic response, but seronegativity not attained.

Serologic Fastness — Failure to show a reduction in serologic titer below the pre-treatment level.

Serologic Relapse — An initial reduction in serologic titer followed by a sudden and progressive increase in titer, indicating an unsatisfactory response to penicillin therapy, or failure of this treatment.

The serologic results following therapy are given in Table III.

DISCUSSION

As stated before, the clinical response of primary and secondary yaws lesions to penicillin therapy was uniformly and invariably excellent. The rapid and complete healing of generalized, large frambesia lesions was dramatic. The serologic response, however, was very different. In the 447 patients whose course was followed by serologic studies, only 71 (15.8 percent) attained seronegativity. Had a less sensitive test been employed, a higher incidence of serologic cures might have been obtained. It is quite possible that some of the earlier investigators, who reported a higher percentage of cures in a short period of time, used serolgic procedures of relatively low sensitivity levels.

The serologic response in yaws is certainly much slower and less satisfactory than that observed in the treatment of early syphilis with a similar amount of penicillin[17]. One of the reasons for this difference may be that in syphilis, therapy is usually started within a few weeks after the development of cutaneous manifestations, whereas the majority of the patients in this study had had yaws for many months.

It is also possible that many more of the patients with yaws in this study may attain seronegativity during the second or third year following therapy. Some patients[18] with a secondary syphilis who were treated with penicillin and were still seropositive at the end of 12 months, have become seronegative during the second year without additional treatment.

From this study it seems that the *amount* of penicillin administered did not appreciably affect the incidence of serologic cures. In Group A, all patients received the same total dosage (1.2 million O.U.). Although in the majority of cases in children in this group the dosage in proportion to the weight was five times as great as that given to the adults, the serologic response differed in no respect from that of the adults. On the other hand, the *duration* of treatment may have some effect. It will be noted that the patients in Group A who received their treatment during a period of four days showed a rate of serologic cure of 25.1 percent; those in Group B who received their treatment in two days, attained a serologic cure rate of 11.0 percent, and those in Group C, who received the same total dosage in one day, showed a cure rate of only 6.4 percent. Thus there was a reduction in the percentage of serologic cures as the duration of treatment was shortened, even though the total dosage was constant.

It was also noted that some of the patients in this study had been treated previously with mapharsen and/or bismuth and had subsequently suffered a relapse or become re-infected. Their clinical and serologic response to treatment with penicillin was similar to that of previously untreated patients.

In March 1947 another study* was initiated in Haiti under the auspices of the Republic of Haiti. Approximately 2000 patients with active early yaws were treated with crystalline sodium penicillin in peanut oil and beeswax. This study has

* This study was made possible through a grant furnished by the Bristol Laboratories, Syracuse, New York, D. K. Kitchen, M. D., Medical Director.

recently been completed and the clinical and serologic results appear to be better than those obtained in the previous study reported above.

In yaws there appears to be considerable uncertainty as to how far serologic reactions are a significant guide to ultimate cure. It seems that a persistently positive reaction does not necessarily mean a lack of therapeutic response. If this is so, then serologic tests should act as an aid in diagnosis and as a guide to treatment rather than as a test to permanent cure. At this stage it would be foolish to compare the permanent results of penicillin treatment of yaws with the results previously obtained with the arsenicals and heavy metals. This much, however, can be said:

1. The lesions heal with great rapidity and the patients are rendered non-infectious very quickly.
2. A single daily intramuscular injection allows for the completion of therapy in a few days. This is an ideal form of therapy for Haiti where protracted schedules cause irregular attendance as well as interrupted and inadequate treatments.
3. Penicillin is certainly less toxic and much safer to use than the arsenicals.

CONCLUSIONS

Based on clinical response penicillin is the drug of choice in the present day treatment of yaws. Penicillin in an absorption-delaying menstruum is of great value in countries such as Haiti where the majority of the patients must be treated in the shortest period of time and on an ambulatory basis in rural clinics.

The clinical results obtained with penicillin were consistently and invariably good. They were definitely better and were obtained more rapidly with penicillin than wtih the previously employed arsenic and bismuth therapy. Furthermore, with penicillin, a maximum amount of therapy could be administered in a minimum period of time without any fear of serious untoward reactions. Although the majority of patients (approximately 93 percent) showed satisfactory serologic progress, only 15.8 percent had attained seronegativity at the end of a twelve month follow-up period.

The cause of yaws is known. A simple and safe form of therapy is available. It is now possible to "cure" yaws in a short period of time at the cost of only a few dollars. There is no reason for 80 percent of the rural population of Haiti to be affected with this crippling and disfiguring non-venereal treponemal disease.

REFERENCES

1. Fox, H.: The Prevalence of Yaws (Frambesa Tropica) in the United States, Arch. Dermat. & Syph. 6:657 (Dec.) 1922.
2. Alderson, H. E., and Coe, H. C.: Report of a Case of Yaws in California, California State J. Med. 21:162 (Apr.) 1923.
3. Fox, H.: Yaws (Case) Soc. Trans., Arch. Dermat. & Syph. 9:778 (June) 1924.
4. Cady, L. D., and Engman, M. F.: A Case of Yaws in Missouri, Arch. Dermat. & Syph. 10:446 (Oct.) 1924.
5. Hogan, B. W.: Presented by Dr. Cheever, Yaws. (Case) Soc. Trans., Arch. Dermat. & Syph. 14:345 (Sept.) 1926.
6. Schamberg, J. F., and Wright, C. S.: Frambesia. (Case) Soc. Trans., Arch Dermat. & Syph. 17:734 (May) 1928.
7. Dwinelle, J. H.: Presented by O. Canizaras. Yaws-Like Lesions of the Feet. (Case) N.Y. Academy of Medicine, Nov. 6, 1946.
8. Post, F. P. and Sheard, C.: A Case of Yaws in New York City. Clinical and Epidermologic Considerations. To be published in the New York State Medical Journal.
9. Cited by Katzenstein, L.: A Case of Yaws in a White American Soldier, Am. J. Syph., Gonor. & Ven. Dis. 29:340 (May) 1945.
10. Lyons, H. A.: Yaws, Report of a Case Appearing in a White Man, U.S. Nav. Med. Bull., 42:1168 (May) 1944.
11. Kinnel, J.: Yaws, Report of a Case Appearing in a White Man, U.S. Nav. Med. Bull. 42:187 (Jan.) 1944.
12. Rifkin, H.: Yaws in a White Soldier, Bull. U.S. Army Med. Dept. 86:81 (Mar.) 1945.
13. Mahoney, J. F., Arnold, R. C., and Harris, A.: Penicillin Therapy in Syphilis, Amer. Jour. Pub. Health. 33:1387 (1943)
14. (a) Whitehill, R. C. and Austrian, R.: Treatment of Primary and Secondary Yaws with Penicillin. Bull. Johns Hopkins Hosp. 75:232 (1944)
    Ibid. Treatment of Yaws with Penicillin. Bull. U.S. Army Med. Dept. 86:84 (1945)
    (b) Lofgren, Robert: Yaws treated with Penicillin. Report of case. U.S. Naval Med. Bull. 43:5, 1025 (1944)
    (c) da Cunha, A. M., Leao, A., Guiamras, N. and Cardosa, H.: Penicillin in the Treatment of Yaws (spirochaetosis). Foreign Letters, Brazil). J.A.M.A. 126:18, 1163 (1944)
    (d) da Cunha, A. M. and Leao, A.: Penicillin in the Treatment of Frambesia. (Foreign Letters, Brazil). J.A.M.A. 128:15, 1120 (1945)
    (e) Findlay, G. M., Hill, K. R. and Macpherson, A.: Penicillin in Yaws and Tropical Ulcer.

(Correspondence), Nature, Dec. 23:795 (1944)
(f) Tompsett, R. R. and Kauer, G. L.: Penicillin Treatment of Early Yaws. Amer. J. Trop. Med. 25:3, 275 (1945)
(g) Dwinelle, J. H., Rein, C. R., Sternberg, T. H. and Sheldon, A. J.: Preliminary Report on the Evaluation of Penicillin in the Treatment of Yaws. Amer. Jour. Trop. Med. 26:311 (1946)
(h) Guimaraes, F.: Buba; Treatment of Tertiary Lesions with Penicillin; Gummatous Ulcerations, Periostitis, Osteitis, Areas of Osseous Rarefaction and Gangosa (Rhinopharyngitis Mutilans): Preliminary Report. Brasil Med. 59:89 (1945)
(i) Stubenford, W. D.: Yaws; Treatment with Penicillin. Southern, N.J. 39:608 (1946)
(j) Hill, K. R., Findlay, G. M. and Macpherson, A.: Treatment of Yaws with Penicillin. The Lancet. 2:522 (1946)
15. Dwinelle, J. H., Rein, C. R., Sternberg, T. H., and Sheldon, A. J.: Preliminary Report on the Evaluation of Penicillin in the Treatment of Yaws. Amer. Jour. Trop. Med. 26:311 (1946)
16. Romansky, M. J., and Rittman, G. E.: Method of Prolonging Action of Penicillin Science 100:196 (1944)
17. Sternberg, T. H. and Leifer, W.: Treatment of Early Syphilis with Penicillin, J.A.M.A. 133:1 (1947)
18. Romansky, M. J. and Rein, C. R.: Treatment of Early Syphilis with Calcium Penicillin—Oil—Bees-Wax, J.A.M.A 132:847 (1946)

Abdominal Total Hysterectomy*

With Important Modifications in Technique

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HYSTERECTOMY — total or subtotal, is a decision that has to be made daily in many operating rooms. The development of a satisfactory technique of total hysterectomy which is yielding a mortality no greater than the subtotal procedure and our increasing awareness of the importance of the prevention of carcinoma of the cervix have combined to make the choice of the total operation a decision of increasing frequency. There has resulted in this group of cases the elimination of the 2 to 3 per cent of cases of stump carcinoma and the prevention of an unknown but definite percentage of other sympton producing conditions.

Vaginal hysterectomy is less often chosen to accomplish this purpose than the abdominal route because of several definite factors viz., 1) lack of adequate vaginal relaxation, 2) the presence of accompanying adnexal disease with dense adhesions, 3) large myoma or ovarian growths, 4) lack of experience in vaginal work.

Carcinoma of the fundus, sarcoma of the uterus and certain cases of pelvic tuberculosis should receive total hysterectomy. Certain selected cases of cervical carcinoma are now being treated by the more extensive total procedure as outlined by several men, notably Meigs, including parametrial block dissection and removal of glands with results which compare very favorably with radiation therapy. It must be borne in mind however that the radical and extensive procedure is justified only by careful selection of cases and by men of expert ability working under specially favorable conditions.

Carcinoma of the retained cervical stump has an incidence as reported by various clinics of from 2.3 per cent (Hendricksen at John Hopkins) to 6.9 per cent (Ward at Woman's Hospital). These figures relate to the percentage of all cervical carcinoma presenting themselves for treatment and are found to have had previous supracervical hysterectomy. If the lesion is clinically recognizable within a period of 12 to 18 months, it may be said to have been present at the time of the supravaginal hysterectomy, and would of course have been prevented by the total procedure. An unknown but definite percentage of cases will develop carcinoma of the cervix at a later period than 12 to 18 months. Thus the total procedure is a valuable safeguard against the development of carcinoma of the cervix and means the saving of lives by the exercise of sound judgment in the selection of this type of operation.

Cauterization and conization properly performed can clear up the vast majority of diseased cervices. Such simple office procedures can be

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