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ON THE USE OF
BELLADONNA IN ENTERIC FEVER



BY JOHN HARLEY, M.D. LOND., F.R.C.P.

WHAT advantages are to be expected from the use of belladonna in enteric fever? is the question which presents itself at the outset of this inquiry, and suggests the need of a proper theory of the action of the drug. This primary question resolves itself into two others, viz. 1, the nature of enteric fever; and, 2, the special action of belladonna in the body. A brief consideration of these will therefore be a proper, if not an altogether necessary, introduction to the main subject.

As to the nature of enteric fever. It will be sufficient for our present purpose to regard it as a general enteritis, accompanied by sympathetic irritation of the lacteal glands and spleen, and commonly associated with more or less pulmonary inflammation—a condition of congestion of the internal viscera,—of dilated blood-vessels and retardation of the blood current amounting at certain points to actual stasis.

As to the action of belladonna. The effects of moderate and oft-repeated doses are as follows:—1, they have a hypnotic and sedative action on the brain and spinal cord respectively; and, 2, a powerful stimulant action on the sympathetic nervous system, as may be demonstrated by the following experiment:—A dog, susceptible of the hypnotic influence of opium, is narcotised by a sufficient dose of morphia for the space of three or four hours. The

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respiration and pulse, which have sunk to a uniform level as soon as narcotism supervened, will be maintained, the first at 14 to 16, and the latter from 65 to 75, a minute, the pulse manifesting a very regular respiratory undulation, rising to 75 towards the end of inspiration, and falling to 65 at the end of expiration. The pupils will be contracted to about $\frac{1}{7}$ th. If now the fraction of a grain ($\frac{1}{98}$ th) of atropia be admitted under the skin during any period of the narcotic stage, remarkable effects are rapidly developed. The finger which could previously feel the apex stroke of the heart with difficulty, now clearly distinguishes a growing excitement, which in the course of a few minutes becomes evident to the eye as well. A quarter of an hour after the injection, the pulse is nearly trebled in frequency. The cardiac excitement progressively increases, and at the end of three quarters of an hour the heart is seen vibrating against the chest-wall, beating regularly 300 times in the minute, being an acceleration of 234 beats for this brief period. This, the maximum acceleration, is sustained for a while, and the rate then slowly declines, but at the end of four hours the pulse is still accelerated some 24 beats beyond the initial rate. The pupils mean time are widely dilated. Further and in respect of the hypnotic influence of belladonna, the same effects result if the atropia be given at a time when the narcotism has passed off and the animal is readily awakened from sleep; but in addition to the stimulant effects on the sympathetic ganglia above described, the animal again lapses into a state of narcotism. Even when the dose of morphia is double, and that of atropia reduced to half, the same effects are observed. Indeed, as I have shown, opium and belladonna both intensify and prolong each other's effects; and since opium as a means of checking excessive diarrhoea was in many of the cases a necessary adjunct to the belladonna treatment, it is proper that I should call attention to the combined operation of the two drugs. It will be understood, therefore, that the action of belladonna on the body is the same whether it be given alone or in combination with opium, but that in the latter case it is somewhat intensified.

Looking, therefore, to the effects of belladonna in dilating the pupils and exciting the heart, we conclude that the drug is

¹ 'Old Veget. Neurotics,' pp. 107, 275.

a direct and powerful stimulant to the sympathetic nervous system.

Let us now inquire what are its effects on the blood-vessels. If we observe the small arteries and capillaries during the operation of moderate doses of belladonna, we shall find that they are maintained for hours in a tonic and slightly contracted condition. The blood is equally distributed, and the circulation in any given part is so tight and rapid, that it really contains a little less blood than when in a quiescent state, and the tissue is consequently a little paler, but the quantity that passes through it in a given time is greatly increased. It is to be expected that a drug which is capable of producing such intense excitement will, if given in excessive doses (and these will be still as to quantity very minute), produce exhaustion. This is actually the case; dilatation of the minute blood-vessels and stasis of the blood being the effects of improper doses. As these observations on the use of belladonna in enteric fever were made about seven years ago, and before belladonna juice was admitted into the Pharmacopœia, I may mention that the succus employed was prepared by Messrs. Jacob Bell & Co., in the manner and proportions since prescribed in the Pharmacopœia. The following were the effects of ℥xxx (a dose given to many of the patients whose cases are narrated below), as noted in six healthy adults, male and female. Belladonna action was fully developed in all within an hour, and completed as far as could be determined by any appreciable effects at the end of the second hour. The pulse in one was accelerated only 10 beats; in another, 20; in a third, 26; in two others, 40 beats; and in the sixth (a youth of twenty), the cardiac systoles were more than doubled, the pulse rising from 60 to 140 beats. No effect on the respiratory movements were observable in any. The individual in whom the acceleration of the pulse amounted to 80, did not throughout the 45 minutes during which this the maximum acceleration continued, manifest the slightest disturbance of the breathing. The respiration never exceeded 18; and at the time when the cardiac excitement first reached its acme and afterwards the inspirations numbered 15 or 16, and were natural and easy.

When the patient is taking thirty minims of belladonna juice every four hours for days together, moderate or excessive symptoms (of which active delirium is the chief) are developed ac-

according to the age or idiosyncrasy of the patient ; and it is never necessary to give this full dose oftener than every six hours. In some cases I have found it necessary to diminish the dose on account of talkative delirium which had evidently been induced by the belladonna ; and, as a rule, I find that ℥xv of the succus given every four or six hours is quite sufficient to sustain that moderate atropism which is beneficial. When delirium has been present, I have never found this dose increase it, but rather the reverse.

In enteric as in scarlet fever, severe congestion of the kidneys, and attendant albuminuria are not uncommon events. For the prevention or relief of this condition belladonna is the appropriate remedy, for I have shown that the whole of the atropia admitted into the body is eliminated unchanged by the kidneys. If, therefore, the quantity of atropia be not excessive, it follows that an active circulation is maintained in these organs during the time they are engaged in its elimination.

With these prefatory remarks I will now introduce my cases, and will afterwards review the particular effects of the drug, and endeavour to draw some general conclusions as to its use in enteric fever.

CASE 1.—*A severe case with much and persistent diarrhœa from the first ; convalescence began on the thirty-eighth day.*

Thomas G—, æt. 19. Had been ill in bed eight days before admission with fever and diarrhœa, six or seven loose stools a day.

Treatment.—He took ℥xxx Succi Belladonnæ sextis horis from the ninth to the thirty-fifth day, and occasional doses of opium.

Progress.—During the second week the diarrhœa was profuse and there was slight nocturnal delirium. On the fifteenth day there was vomiting. On the thirty-eighth the stools became solid and natural, and convalescence commenced, and was effected without interruption.

9th day.—℥xxx Succi Belladonnæ, sextis horis. Restlessness ; slight delirium at night ; several loose stools ; no rash ; tongue fissurally ulcerated, moist. Temperature 104.° Pulse 112. Such was the condition before the medicine was given.

- 10th.—℥v *Tincturæ opii* with each dose of Belladonna. Much diarrhœa last night; tongue dryish. T. 100·4°. P. 84.
- 11th.—Gr. x *Pilulæ saponis co.* = gr. ij *Pulveris opii*. Slept after the additional opium; great dryness of the mouth and thirst; belly retracted, one rose spot, one loose stool. T. 100°. P. 100.
- 12th.—Two loose stools last night; skin and tongue dry. T. 102·6°. P. 80.
- 13th.—Two loose stools last night; tongue clean and moist, cracks contracting; pupils $\frac{1}{2}$; brighter, and said he was better and hungry. T. 99·2°. P. 96.
- 14th.—℥xx *Tincturæ opii* as an enema. Several loose stools. T. 100°. P. 92.
- 15th.—Gr. i *Pulveris opii*. Bowels quiet; tongue dry. T. 100°. P. 96.
- Evening.—Much abdominal pain; vomiting. T. 100°. P. 112.
- 16th.—One stool; tongue dry down the centre, with deeply ulcerated fissures; mind tranquil. T. 100·4°. P. 84.
- Evening.—T. 101·2°. P. 84.
- 17th.—Bowels quiet; felt comfortable. T. 100·4°. P. 84.
- 18th.—*Pulveris opii* gr. i, *sextis horis*. Bowels loose last night. T. 100°. P. 84.
- 19th.—Bowels quiet. T. 99·2°. P. 80.
- 20th.—Two loose stools. T. 99·2°. P. 78.
- 21st.—Bowels quiet; asked for food; tongue moist. T. 99°. P. 72.
- 22nd.—Omitted the opium. One loose stool. T. 99·4°. P. 72.
- 23rd.—Two loose stools last night; tongue clean, fissured. T. 99·4°. P. 72.
- 24th.—No action of the bowels. T. 99°. P. 84.
- 25th.—No action of the bowels; abdomen thin and tense; a little uneasy in breathing; tongue moist and clean; the cracks healing. T. 99·2°. P. 84.
- 26th.—Bowels open twice; abdomen softer, still a little uneasy in breathing; tongue clean and wet. T. 97·4°. P. 72.
- 27th.—Two loose stools. T. 98·2°. P. 80.
- 28th.—Two loose stools. T. 98·6°. P. 72.
- 29th.—*Pulveris opii* gr. i, *sextis horis*. Four loose stools since yesterday; tongue clean and moist; cracks nearly healed; great hunger. Temperature 98·8°. Pulse 92.

- 30th.—Omitted the opium. Two loose stools. T. 99°. P. 72.
 31st.—*Enema opii* = ℥xx *Tincturæ opii*. Six loose stools; appeared bright and well. T. 97·8°. P. 76.
 32nd.—No action of the bowels. T. 99·2°. P. 76.
 33rd.—No action of the bowels. T. 98·8°. P. 72.
 34th.—Two moderately loose yellow stools. T. 99°. P. 104.
 35th.—*Haustus cinchonæ* in place of the belladonna. No action of the bowels; tongue and abdomen natural, and the patient was bright and comfortable.

CASE 2.—*A severe case with prostration; the treatment adopted in the mid-career of the disease. It was probably the thirty-fourth day before convalescence began.*

Catherine P—, æt. 11, admitted August 11th, duration of illness uncertain, chief symptoms fever and diarrhœa.

Treatment.—She took ℥xv Succi belladonnæ from the first to the eighteenth day of her sojourn in the hospital, and from the second day took six ounces of wine daily.

Progress.—Excessive prostration was the chief feature of this case. Belladonna was given from the fourteenth (?) to the thirty-third day. Bronchitis threatened on the tenth day of treatment; the prostration was greatest on the twelfth. From this time she began to improve, and on the eighteenth day of treatment convalescence was established and recovery was rapid.

August 11th.—℥xv *Succi belladonnæ, quartis horis*. Hot poultice to the abdomen. Prostrate, apathetic, pale, and emaciated; respiration frequent, with sighing and moaning; teeth dirty with sordes; tongue dry, brown; abdomen full and hard; bowels loose; sickness. Temperature 104°. Pulse 128.

12th.—Six ounces of wine. Great prostration. T. 104°. P. 130.

13th.—Retention of urine; bowels loose. T. 104°. P. 130.

14th.—Mouth dry and black with sordes; bowels quiet. T. 101°. P. 120.

15th.—No action of the bowels. T. 101·4°. P. 120.

16th.—No action of the bowels; condition much the same. T. 100·4°. P. 108.

- 17th.—Two loose stools. T. 102·2°. P. 108.
 18th.—Two loose stools. T. 100·2°. P. 120.
 19th.—Abdomen soft; sordes moistening. T. 98°. P. 116.
 20th.—Mucous râles over the bases of the lungs; restlessness.
 T. 98·2°. P. 120.
 21st.—Very apathetic still; mouth still black with sordes;
 bowels not open. T. 101·2°. P. 116.
 22nd.—Prostration extreme, nearly unconscious, slipping down
 in the bed, and rolling the head from side to side.
 T. 107°. P. 112.
 23rd.—Less restlessness. T. 98·6°. P. 120.
 24th.—Bowels open once, the first time for five days, stool solid;
 sleep less disturbed. T. 98·6°. P. 120.
 25th.—Consciousness returning; gave an answer for the first
 time; tongue moistening; sordes disappearing. T. 98°. P. 116.
 26th.—Improving. T. 98·2°. P. 116.
 27-8th.— ζj *Olei ricini* each day. Much improved; bowels had
 not acted for four days. T. 98°. P. 116.
 29th.—Substituted *Haustus cinchonæ* for the belladonna. The oil
 acted to-day, giving two stools, the first nearly solid,
 the second rather loose; greatly improved; lay on the
 side, looking bright and cheerful; mouth clean and
 moist. Temperature 98·2°. Pulse 88.

CASE 3.—*A moderate case and early convalescence.*

Esther L—, æt. 16. Had been ill seven days before admission with sickness, diarrhœa, and abdominal pain.

Treatment.—From the seventh to the twelfth day she took $\mathfrak{m}x$ *Acidi sulphurici diluti cum* $\mathfrak{m}v$ *Tincturæ opii*; thence forward to the twenty-fifth day *Succi belladonnæ* $\mathfrak{m}xv$, cum *Tincturæ opii* $\mathfrak{m}v$, quartis horis.

Progress.—Nervous symptoms were absent in this case. Improvement began on the twelfth day, and continued without interruption until the twelfth day of the belladonna, the twenty-fourth of the disease, when convalescence was established.

- 8th day.—*Haustus acidi sulphurici et opii*. Tongue dry and fissured; abdomen tense and painful; three loose stools; rose rash. T. 103°. P. 120.
- 12th.—℥_{xx} *Tincturæ belladonnæ*, ℥_v *Tincturæ opii*, *quartis horis*. Continued in the same state, the temperature varying from 103° to 102°; and the pulse from 102 to 104.
- 13-17th.—Tongue still dry; voice husky; abdomen natural; rash faded; one loose stool every day. Temperature varied from 102·3° to 99°; and the pulse from 104 to 96.
- 19th.—Improved; tongue dryish, the cracks healing; somnolency; no action of the bowels the last two days. T. 99°. P. 84.
- 22nd.—One moderate, consistent, yellow stool; tongue moist, clean, and pink; bright and cheerful. T. 98°. P. 80.
- 24th.—Belladonna and opium discontinued. Tongue and abdomen natural; convalescent. Temperature 98°. Pulse 80.

CASE 4.—*A mild case, convalescence on the twenty-fifth day.*

George W—, aged 22. Had been ill fourteen days before admission with headache, anorexia, and fever.

Treatment.—He took ℥_{xxx} *Succi Belladonnæ*, *quartis horis*, from the seventeenth to the thirtieth day.

Progress.—The symptoms declined in severity from the day of admission.

- 14th day.—*Haustus acidi sulphurici et opii*. Bowels loose; tongue moist, with red edges. T. 102°. P. 110.
- 17th.—℥_{xxx} *Succi belladonnæ*, *quartis horis*. Continued in the same state; numerous rose spots and bluish blotches; bowels loose. T. 100°. P. 90.
- 18th.—Bowels quiet. T. 98°. P. 72.
- 19th.—Fresh rose spots; bowels quiet. T. 98°. P. 72.
- 20th.—Bowels quiet. T. 97·8°. P. 60.
- 21st.—Bowels quiet. T. 98·2°. P. 72.
- 22nd.—Bowels quiet. T. 98·6°. P. 60.
- 23rd to 29th.—Continued to improve; motions become consistent; convalescence. During these days the temperature ranged from 98·6° to 97·6°, and the pulse from 80 to 60.
- 30th.—Belladonna discontinued. The patient left his bed.

CASE 5.—*A moderately severe case, hæmorrhage on the eleventh, convalescence on the twenty-fourth day.*

Esther P—, aged 20. Had been ill a week before admission with headache and looseness of the bowels.

Treatment.—She took ℥xxx Succi belladonnæ, quartis horis, from the seventh to the eleventh and from the fourteenth to the twenty-second day.

Progress.—There was constipation from the seventh to the eleventh day, when there was hæmorrhage. Convalescence began on the eighteenth day of the disease. With an interruption of two and a half days the belladonna was given during sixteen days.

7th day.—℥xxx Succi belladonnæ, quartis horis. Abdomen full and hard; several rose spots; tongue dry and cracked; restless; delirium at night. T. 103°. P. 120.

8th.—Bowels quiet. T. 102·6°. P. 120.

9th.—Bowels quiet. T. 103°. P. 120.

10th.—Poultice to the abdomen. Bowels not acted since admission; abdomen tense; tongue dry and brown. T. 101·6°. P. 108.

11th.—Substituted *Haustus terebinthinæ* in the evening for the belladonna, and gave ℥xx *Tincturæ opii* as an enema. Bowels quiet all day, but in the evening there was hæmorrhage, estimated at half a pint. T. 102·2°. P. 132.

12th.—Bowels quiet. T. 103°. P. 124.

13th.—A loose stool, but no trace of blood. T. 99·1°. P. 116.

14th.—Omitted the turpentine and resumed the *belladonna*. Bowels open once; tongue moist and cleaning. T. 99·4°. P. 112.

15th.—Bowels open once. T. 100°. P. 108.

16th.—No action of the bowels. T. 98°. P. 96.

17th.—No action of the bowels; tongue natural. T. 98·2°. P. 88.

18th to 23rd.—Discontinued the belladonna on the twenty-second day. Comfortable, cheerful, and very hungry; the temperature and pulse retaining their normal character; convalescence was rapid.

CASE 6.—*An ordinary case with early prostration.
Convalescence on the twenty-second day.*

Robert H—, aged 63. Had been ill three days before admission with general pains, much thirst, and looseness of the bowels.

Treatment.—He took ℥xxx Succi belladonnæ, quartis horis, from the fourth to the twentieth day.

Progress.—Diarrhœa ceased on the twelfth day of treatment. There was much complaint of a bitter taste as long as the belladonna was continued.

4th day.—℥xxx Succi belladonnæ, quartis horis. Tongue dry and brown; great prostration; three loose stools. T. 100·8°. P. 84.

5th.—T. 100·8°. P. 84.

6th.—Tongue unchanged; six loose stools in the night. T. 99·2°. P. 84.

7th.—Bowels quiet. T. 100·8°. P. 76.

8th.—Tongue moistening at the edges; no action of the bowels; said he was much better. T. 98·6°. P. 76.

9th.—Tongue still dry; bowels open once. T. 99°. P. 72.

10th.—Five loose stools last night. T. 99°. P. 72.

11th.—Tongue dryish and cracked in the centre, moist and clean elsewhere; abdomen natural; said he was very comfortable. T. 100°. P. 80.

12th.—Bowels loose. T. 98·4°. P. 84.

13th.—℥xx Tincturæ opii, as an enema. Tongue quite dry; several loose stools. T. 99°. P. 108.

14th.—Bowels quiet. T. 99·4°. P. 72.

15th.—Bowels quiet. T. 99·6°. P. 72.

16th.—Bowels quiet. T. 99·8°. P. 84.

17th.—Improving; the cause of the increased pyrexia on this and the following day was not obvious. T. 103·6°. P. 120.

18th.—T. 103·6°. P. 120.

19th.—T. 98·2°. P. 72.

20th.—Discontinued the belladonna. Much improved; tongue clean. T. 98·2°. P. 72.

21st.—Bowels had acted to-day, the first time for five days, stool solid; convalescence was uninterrupted from this date. T. 98·2°. P. 72.

22-26th.—During these days the temperature ranged from 98·6° to 98·2°; and the pulse from 80 to 48.

CASE 7.—*A severe case. Hæmorrhage on the fifteenth, eighteenth, and nineteenth days. Convalescence began on the twenty-seventh day.*

John G—, æt. 24. Had been ill seven days before admission with headache, continued diarrhœa, and general pains.

Treatment.—He took ℥xxx Succi belladonnæ cum tincturæ opii, ℥v sextis horis, till the evening of the twentieth, when, on account of the hæmorrhage, turpentine was prescribed instead.

Progress.—Insomnia; restlessness and moderate nocturnal delirium marked the earlier days of the disease. Great relief followed the hæmorrhage on the fifteenth day. An increase of pyrexia attended the second bleeding on the eighteenth day. An eruption of sudamina appeared on the twentieth, and thenceforward the progress towards recovery was rapid.

8th day.—℥xxx Succi belladonnæ et ℥v Tincturæ opii, sextis horis, in addition ℥xv Tincturæ opii to-night. Tongue dry; abdomen rather full and hard; very restless; insomnia; rash abundant. T. 104·4°. P. 120.

9th.—Several loose stools. T. 104·4°. P. 96.

10th.—Rash very copious and large. T. 103·6°. P. 108.

11th.—℥xx Tincturæ opii as an enema. Diarrhœa continued. T. 104·2°. P. 120.

12th.—Bowels still loose; tongue covered with yellow fur; insomnia.

13th.—Repeat the *Enema opii*. Bowels still loose. T. 103·2°. P. 96.

14th.—Sedative = ℥xv Tincturæ opii. Slight delirium; abdomen tense; much sweating; tremor of the lips and hands; numerous fresh spots; two loose stools. T. 102·4°. P. 92.

Evening.—Continued restless all day. T. 102·2°. P. 130.

15th.—Four loose stools, each with blood; amounting in all to a considerable quantity. Fresh spots. T. 102°. P. 96.

- Evening.—Substituted turpentine draught for the belladonna ;
Enema opii. Tongue moist ; one stool with a tinge of
 blood ; skin cool. T. 100°. P. 80.
- 16th.—Bowels not open during the previous night, but thrice to-
 day, without blood ; tongue moist and red. T. 102°. P. 96.
- 17th.—Brandy ℥ij. Weaker, but comfortable ; tongue moist.
 T. 101·4°. P. 92.
- 18th.—Bowels open twice ; about half a pint of dark blood in
 last stool. T. 104°. P. 100.
- 19th.—Two loose stools, tinged with blood. T. 102·6°. P. 108.
- 20th.—*Enema opii*. Four loose stools, with slight tinge of
 blood ; a few new spots ; eruption of sudamina ; tongue
 moist and clean ; slept well ; abdomen rather full.
 T. 102·8°. P. 104.
- 21st.—Bowels open once ; no blood. T. 102°. P. 100.
- 22nd.—Three loose stools. T. 101·4°. P. 104.
- 23rd.—One stool, more consistent. T. 100·8°. P. 92.
- 24th.—One dark bilious, more consistent stool to-day ; tongue
 moist and nearly clean ; comfortable and cheerful ;
 convalescence was uninterrupted. T. 101·2°. P. 92.

CASE 8.—*A moderately severe case, with early prostration.*
Convalescence began on the twentieth day.

James M—, æt. 6. He had been ill seven days before
 admission, with fever and diarrhœa.

Treatment.—℥xv Succi belladonnæ, sextis horis, from the
 eighth to the twenty-seventh day.

Progress.—There was great pallor and apathy throughout.
 The diarrhœa and prostration were relieved on the eighth day
 of treatment. On the twentieth day there was hunger. From
 this date the motions became consistent, and on the twenty-
 seventh day the evacuations were natural.

- 8th day.—Restless ; pallid ; tongue dry and brown ; three loose
 stools. T. 103°. P. 130.
- 9th.—℥xv Succi belladonnæ, sextis horis. A few rose spots.
 T. 103°. P. 130.
- 10th to 16th.—Prostration with restlessness, and from two to four
 loose stools a day. T. 103° to 100·5°. P. 130 to 120.

- 17th.—Progress gradual; now much improved; sat up in bed; tongue clean and moistish; one loose stool a day since the fifteenth. T. 99·2°. P. 120.
- 18th.—T. 103·2°. P. 120.
- 19th.—Intelligence returned; tongue clean and moist. T. 97·8°. P. 100.
- 20th.—Convalescing. Only one stool during the last two days. T. 98°. P. 108.
- 23rd.—Still improving. One moderately loose stool. T. 98°. P. 96.
- 24th.—One consistent stool. T. 97·2°. P. 100.
- 26th.—Belladonna discontinued. A natural stool; convalescence rapidly completed from this date. T. 97·2°. P. 96.

CASE 9.—*The abdominal symptoms were severe during the second week, but convalescence was unusually early, beginning on the eighteenth day and continuing without interruption.*

Alice H—, æt. 20. Had been ill nine days with fever and diarrhœa before admission.

Treatment.—She took ℥xxx Succi belladonnæ, quartis horis, from the eleventh to the twenty-third day, and on the eleventh day an opiate enema was required.

Progress.—Beyond a little restlessness and nervousness during the first week, there were no nervous symptoms. Convalescence began on the eighteenth day.

- 10th day.—Abdomen full and tender; no decided rash; three loose stools; tongue dry anteriorly. T. 104°. P. 120.
- 11th.—℥xxx Succi belladonnæ, quartis horis; xx Tincturæ opii as an enema. Several loose stools; respiration nervous. T. 104°. P. 120.
- 12th.—Tongue glazed; face flushed. T. 103·4°. P. 100.
- 13th.—Three loose stools. T. 105°. P. 92.
- 14th.—Abdomen still full and rather tense. T. 99°. P. 80.
- 15th.—One loose stool to-day; belly soft. T. 98·4°. P. 88.
- 16th.—Two loose stools to-day. T. 98°. P. 80.
- 17th.—One stool; tongue clean and moist; convalescing. T. 98°. P. 80.

18th to 23rd.—Discontinued the belladonna. During these days convalescence was uninterrupted; there was no action of the bowels for the first three days, but one natural stool each day since. Now bright and hungry. T. 99° to 98·2°. P. 96 to 68.

CASE 10. — *A case of moderate severity, accompanied by prostration and catarrhal symptoms with sweating. Convalescence began on the twenty-seventh day.*

John M—, æt. 18, had been ill thirteen days before admission, with headache, anorexia, and diarrhœa.

Treatment.—He took ℥xxx Succi belladonnæ, quartis horis, from the fourteenth to the thirty-first day, combined with ℥v Tincturæ Opii, from the nineteenth to the twenty-third day.

Progress.—Profuse sweating set in on the fourth day of the belladonna treatment, and continued with intermissions of a few hours during the next nine days. There was general relief on the tenth day of treatment.

14th day.—*Haustus acidi sulphurici et opii.* Very prostrate and apathetic; tongue dry and glazed; bowels loose. T. 103°. P. 96.

15th.—℥xxx Succi belladonnæ, quartis horis. Omit the former medicine. T. 103°. P. 100 before the belladonna.

16-17th.—Continued in the same general condition. T. 100·4°. P. 72.

18th.—Tracheal cough; considerable sweating. T. 97·6°. P. 56.

19th.—Add ℥vi Tincturæ opii to each dose of belladonna. Slight bronchitis; bowels still loose. T. 102°. P. 76.

20th.—Great prostration; bowels moderately loose. T. 101·6°. P. 72.

21st.—Apathetic; tongue dry, with wide moist edges. T. 101·2°. P. 72.

22nd.—T. 100°. P. 72.

23rd.—Discontinued the opium and took ℥xxx Succi belladonnæ alone every six hours. Improved; drowsy; bathed in sweat; respiration 12; abdomen natural; no action of bowels for two days. T. 93·6°. P. 56 to 43.

24th.—One loose stool. T. 101·4°. P. 88.

25th.—T. 99·2°. P. 52.

- 26th.—Much brighter; tongue clean and moist. T. 98·2°. P. 60.
 27th.—“Felt very well.” Profuse sweating; tongue clean and moistish. T. 98°. P. 64.
 28th.—A solid stool. Hunger. T. 101°. P. 80.
 29th.—A solid stool. Hunger. T. 99·8°. P. 84.
 30th.—A solid stool. Hunger; sweating continued. T. 99·8°. P. 84.
 31st.—Belladonna discontinued. Convalesced from day to day; stools natural. To-day took solid food; the sweating ceased, leaving the skin naturally moist. T. 100° to 98·4°. P. 68 to 54.

CASE 11.—*A severe case during the first fortnight, but convalescence was rapid, beginning on the twentieth day.*

Marianne H—, æt. 19. Had been ill several days before admission with fever and diarrhœa.

Treatment.—She took ℥xx Succi belladonnæ cum ℥v Tincturæ opii from the eighth to the twenty-second day.

Progress.—There were diarrhœa, much stupor, and quiet delirium until the fourteenth day, at which date bile reappeared in the stools, and desire for food returned.

- 8th day.—*Succi belladonnæ* ℥xx, *Tincturæ opii* ℥v, *quartis horis*. Delirious; tongue dry; abdomen tender; rose rash; four loose stools. T. 104°. P. 125.
 13th.—Had continued in much the same condition; fresh eruption; moderate diarrhœa; abdomen now tense and tender; tongue dry, glazed, and contracted. T. 104° to 101·5°. P. 120 to 98.
 14th.—Four loose stools; a dry, tracheal cough. T. 100°. P. 98.
 15th.—Much improved; two loose stools; abdomen natural; tongue moistening, and epithelium separating. Asked for an egg. T. 100°. P. 95.
 18th.—Continued improvement; one loose, bright yellow stool each day; tongue moist at edges. T. 98°. P. 80.
 20th.—Convalescing. T. 97°. P. 72.
 32nd.—Omit the mixture. Tongue natural; two yellow semi-solid stools. Rapid convalescence. T. 98°. P. 80.

CASE 12.—*A severe case, complicated with broncho-pneumonia. Convalescence began on the thirty-second day of her sojourn in the hospital, probably about the fortieth day of the disease.*

Emily C—, æt. 5, admitted, on an unascertained day of fever, with great pyrexia; pulse 132, tongue dry, abdomen full, profuse diarrhœa, and indications of general broncho-pneumonia moderately developed.

Treatment.—For the first sixteen days she took ℞xxx Succi belladonnæ, quartis horis, with occasional doses of senega and ammonia; and the next seven days the same dose of belladonna every six hours. Poultices of linseed and mustard were continually applied to the chest during the prevalence of the bronchial symptoms.

Progress.—On the twelfth day after admission there was fully developed bronchitis, diffused through both lungs, with harsh crepitant inspiration and a troublesome dry cough. During the next few days there was very copious frothy expectoration. On the seventeenth day there was great amelioration, the cough and expectoration were much diminished, the pulse was 98, and the tongue clean and moist. The improvement continued over the twenty-first day, when the pulse was 92. A slight increase of pyrexia followed, which gradually declined, and on the thirty-second day after her admission she was convalescent. The enteric symptoms were moderate, the stools continued loose and ochre-coloured to the twenty-third day, but the motions never exceeded three in the twenty-four hours.

The average daily rate of the pulse was 109. After the first four doses of the belladonna it was reduced to 100, and at the height of the pyrexia it numbered during two days (the twelfth and thirteenth) 132.

On the twenty-sixth day the tongue was clean and moist, and the motions hard. The pupils were widely dilated throughout, but there was neither delirium nor insomnia.

CASE 13.—*A case of moderate severity and early convalescence.*

Charlotte Y—, æt. 12, admitted on the seventh day of fever, suffering general pains; bowels loose; face flushed; dorsal decubitus; moderate pyrexia; pulse 120; tongue moist, coated, cracked at the centre.

Treatment.—She took ℥xxx Succi belladonnæ, sextis horis, from the seventh to the fifteenth day, and ℥xv, sextis horis, from the fifteenth to the twenty-first day.

Progress.—The condition was typhous¹ for five days after admission; the tongue was cracked; the abdomen moderately distended, and there was moderate diarrhœa. On the evening of the twelfth day, the rose spots were faded, and she passed, in a stool chiefly fluid, a small quantity of soft almost formed fæcal matter of natural colour. From this time there was no diarrhœa. On the fourteenth day there was a great improvement, and on the seventeenth she lay on her side and complained of hunger. On the nineteenth day the pyrexia was absent, and on the twenty-second she was convalescent, the bowels were acting naturally, and she took fish. She left the hospital on the thirty-third day.

Analysis of symptoms.—There was moderate delirium during the ninth, tenth, and eleventh days, when the abdominal disease was most urgent. The tongue became moist and was clean on the fourteenth day. The daily average of the pulse from the day of admission to the day of convalescence was 100. It fell to 108 on the eighth day, and again attained its maximum 120 on the twelfth, and thenceforward declined.

CASE 14.—*A case of moderate severity. Death from inanition and exhaustion on the thirty-eighth day. Cicatrization of the intestinal ulcers.*

Catherine M—, æt. 30, a spare, weakly woman, the mother of Ellen (see Case 24), was admitted on the fourth day of a febrile attack, which began with rigors, headache, and pains in the limbs. A few rose papules appeared on the sixth day, when the tongue was dry, brown, and cracked. Next day there was

¹ Sordes, severe prostration and pyrexia, dorsal decubitus, delirium, and a parched tongue.

a plentiful crop of rose rash, sordes on the teeth and tongue, and considerable pyrexia and prostration. The stools were still formed, and the bowels rather confined.

Up to this, the sixth day, she took acetate of ammonia, and the daily average of the pulse was 117.

Treatment.—She took ℥xv Succi belladonnæ, sextis horis, from the seventh to the thirty-fifth day; and from the twelfth to the twenty-sixth day gr. j, Opii (pilulæ saponis compositæ gr. v) in addition.

Progress.—The rash continued to appear until the eighteenth day. She had moderate diarrhœa (from one to three watery stools in the twenty-four hours) from the seventh to the twenty-eighth day. The daily average of the pulse from the seventh to the thirty-third day was 113. On the thirty-third day convalescence had seemingly begun, the pulse was 112, and she was impatient for meat. On the thirty-fifth day, after non-action of the bowels for five or six days, a simple enema brought away a soft and natural motion. On the thirty-seventh day she took fish and enjoyed it, but the stomach did not retain it; the sickness increased the prostration, which was a marked feature throughout her illness. A vesicular rash of bloody serum broke out over both elbows and knees, the pulse rose to 132, and she sunk the next day apparently from inanition, greatly emaciated.

She was evidently badly nourished when the illness overtook her, and hunger was a prominent symptom on the eleventh and twenty-eighth days and subsequently. On the twenty-third day the pulse obtained its maximum, and there was active delirium for forty-eight hours; but on the twenty-seventh day she was lying composedly on her side, and she slept tranquilly through the greater part of her illness. The tongue moistened on the eleventh day; and, except on the fourteenth, it was afterwards quite moist.

The *post-mortem* examination revealed smooth and almost pale cicatrices in the place of Peyer's patches in the lower part of the ileum, and above this, ulcers in an advanced state of cicatrization. The large intestine was healthy, and contained healthy fæces. The liver was friable and greasy. Both lungs were bound to the chest-walls by old membranous adhesions, and the lower lobes were in a state of splenization.

CASE 15.—*An attack of moderate severity, with limited bronchitis. Convalescence on the thirtieth day.*

Jane J—, æt. 19, was admitted on the fifteenth day of an attack of fever, with diarrhœa and rose rash, moderate pyrexia, pulse 124, abdomen painful, tongue moist.

Treatment.—She took from the sixteenth to the twenty-eighth day ℞xv Succi belladonnæ, sextis horis; and from the nineteenth to the twenty-sixth ℞x Spiritus terebinthinæ, ter in die, and also ℥iv of wine a-day.

Progress.—Fresh rash appeared till the nineteenth day. The diarrhœa ceased after the twenty-first day. There was prostration and limited bronchitis from the nineteenth to the twenty-third day. On the twenty-sixth day there was great improvement and hunger. On the twenty-eighth the pulse and temperature were normal, the bowels constipated, and she once vomited her food (custard). The next day the skin was perspiring freely. She was convalescent on the thirtieth day, but required several doses of castor oil subsequently to relieve constipation.

CASE 16.—*A moderately severe attack of enteric fever, with prostration and apathy. Convalescence dated from the thirty-eighth day.*

Johanna G—, æt. 12. Admitted on the seventeenth day of an attack of fever; abdomen tense and painful, and exhibiting a few rose papules; pulse 116; apathetic.

Treatment.—She took ℞xv Succi belladonnæ, sextis horis, from the eighteenth to the thirty-eighth day.

Progress.—The pulse fell to 100 the day after admission, and from this time to the thirty-eighth day the daily average was 78. Fresh rash appeared till the twenty-seventh day. There was delirium on the twentieth and twenty-first days, and she was drowsy and apathetic on the twenty-second. The tongue was moist throughout, and, excepting during the second week, there was no diarrhœa.

CASE 17.—*A moderately severe attack of enteric fever.
Convalescence on the thirtieth day.*

Jane S—, æt. 18, was admitted on the tenth day of a severe attack of fever, which was attended with purging and vomiting from the first. There were a few rose papules on the abdomen; pain in the cæcal region and high fever; and a dry, red, and cracked tongue.

Treatment.—She took ℥xv Succi belladonnæ, sextis horis, from the eleventh to the thirtieth day; and gr. j Opii, omni die, from the thirteenth to the twentieth day.

Progress.—Fresh rash appeared till the twenty-first day. Diarrhœa was rather severe between the thirteenth and eighteenth days, when it ceased, and was followed by constipation. On the twenty-second day the motions were hard, and there was hunger. The daily average of the pulse was 77; the tongue moistened on the twelfth day, and continued moist and clean, but abnormally red throughout.

CASE 18.—*Acute tuberculosis of the lungs and intestines, simulating ordinary pneumonenteritis. Death on the eighteenth day.*

Charity G—, æt. 15, fair and fat, admitted on the eighth day of her illness, which arose from cold, and was attended by anorexia and diarrhœa. The pyrexia was moderate; pulse 116; the tongue dry, red, and cracked, but moist at the edges; abdomen natural, with eight or nine rose papules; diarrhœa; the face much flushed.

Treatment.—She took ℥xv Succi belladonnæ, sextis horis, from the eighth to the eleventh day, and ℥viiss from the eleventh to the eighteenth. Poultices were continually applied to the abdomen from the fifteenth day, and she took ℥viiij of brandy on the sixteenth and seventeenth days.

Progress.—The patient got rapidly worse; the pulmonary congestion and abdominal inflammation became intense; the iliac and umbilical regions were very painful and tender; fresh rash was developed until the fifteenth day. There were delirium and sordes on the tenth day. On the sixteenth the pulse was

140, and on the eighteenth day 178, and the respirations 50; the surface became livid, the abdomen distended, and she died on the eighteenth day.

The whole of the glands of the last three feet of the ileum were enormously swollen and converted into yellowish-black sloughs, surrounded by dark purple elevated and almost bleeding edges. The lungs weighed $3\frac{1}{2}$ pounds, and were severely congested and stuffed with sago-like grains of recent tubercle.

CASE 19.—*A moderately severe case. Convalescence on the thirty-third day.*

Ann B—, æt 8. Ill a fortnight before admission. On the fifteenth day of the disease enteric fever was fully developed; rose spots on the full, painful abdomen; watery ochre-coloured stools; tongue red and cracked; pulse 120; temperature 101.4.

Treatment.—From the fifteenth to the thirtieth day of the disease she took ℥xxx Succi belladonnæ, quartis horis, and thenceforward to the thirty-fourth day the same dose every six hours.

Progress.—There were never more than three watery stools in the twenty-four hours, and some days only one. The temperature reached 103.2° , and the daily average of the pulse was 110. The tongue was moist from the sixteenth day onwards, and usually clean and red; the skin, however, continued harsh and dry. There was no diarrhœa after the twenty-fifth day, and on the thirtieth day the motions were hard. Convalescence was established on the thirty-third day.

CASE 20.—*A mild case. Convalescence on the twenty-third day.*

Mary W—, æt. 7. Admitted on an undeterminable day of pyrexia and abdominal tenderness, with occasional diarrhœa. Symptoms of enteric fever were not positively declared until the eleventh day after admission; up to which time the daily average of the pulse was 112, ranging from 144 to 92. She took acetate of ammonia.

Treatment.—℥xv Succi belladonnæ, sextis horis, from the eleventh to the twenty-second day.

Progress.—On the fourteenth day the pulse had fallen from

128 on the eleventh, to 92. Moderate diarrhœa continued for several days, but the pulse gradually fell to 84, and her condition improved, so that on the twenty-third she was convalescent and took fish.

CASE 21.—*A mild case. Convalescence on the eighteenth day.*

Annie H—, æt. 6. Admitted on an undeterminable day of a pyrexial attack, which proved on the fourth day of her residence in the hospital to be due to enteric inflammation. Up to this date she took acetate of ammonia, and the daily average of the pulse was 123.

Treatment.—From the fourth to the eighteenth day she took ℥xv Succi belladonnæ, sextis horis.

Progress.—The diarrhœa was moderate, and she was convalescent on the eighteenth day; indeed, she began to eat fish on the fourteenth day.

CASE 22.—*A case of moderate severity. Delivery of a seven and a half months' child on the thirty-first day. Relapse on the fifty-second day. Convalescence on the sixty-eighth day.*

Charlotte L—, æt. 38, pregnant, between seventh and eighth months. Admitted on the twenty-first day of an attack of fully developed enteric fever. The rose rash was present. On the average there were two watery stools a day; pulse 128, of good volume and power; temperature 103°; tongue parched, covered with a thick layer of cracked exfoliating epithelium; pupils dilated.

Treatment.—She took from the twenty-first to the sixty-second day ℥xv Succi belladonnæ, sextis horis.

Progress.—The eruption continued to appear until the thirtieth day; the pulse declined, numbering day by day 108, 104, 104, 104, and 112; the tongue was damp; the diarrhœa was unchecked. On the thirty-first day labour pains came on, and she was delivered without undue hæmorrhage. Both mother and child progressed favorably. The lochial discharge was scanty, and ceased on the forty-sixth day; the diarrhœa moderate; and the pulse, after attaining a maximum of 116 on the thirty-second day, declined to 88 on the fortieth, when the tongue and skin were naturally moist. The bowels had not

acted for two days; and there was desire for solid food. No milk was secreted, and on the forty-second day the breasts were small and flaccid: she had previously had abundance of milk, and nursed eleven children. The motions on this day were solid, the pulse 100, and she appeared convalescent. She took fish on the forty-second, but the bowels again becoming loose on the fifty-second day, it was discontinued on that day. The relapse, with vomiting of bilious matter on two or three occasions, diarrhœa alternating with constipation, and the eruption of fresh spots, continued until the sixty-seventh day. After which she rapidly convalesced, and was quite well on the seventy-second day, and both the patient and her infant left the hospital well on the eightieth day.

The relapse was attended with greater pyrexia than the first part of her illness, the daily average of the pulse being 110. On the day after the belladonna was omitted it fell from 120 and 124 the two previous days to 108, and then gradually declined.

CASE 23.—A mild case. Convalescence on the twentieth day, followed on the twenty-sixth by a mild attack of variola.

Elizabeth S—, æt. 23. Admitted on the sixth day of an attack of enteric fever. A rose rash was present on the chest and abdomen; the pyrexia was considerable; pulse 132; temperature 103.1° ; the bowels confined; the tongue moist and coated. She took acetate of ammonia until the tenth day. There was a plentiful eruption of rash, constipation, and a declension of the pulse to 108.

Treatment.—From the tenth to the eighteenth day she took ℞xv Succi belladonnæ, quartis horis.

Progress.—Excepting a considerable rise of pyrexia on the eleventh day, accompanied by diarrhœa, the symptoms rapidly abated, and she was convalescent the eighteenth day, and continued well up to the twenty-sixth day, when she had a slight pyrexial attack, followed by a sparse eruption of modified variola, which was very prevalent at this time.

The daily average of the pulse during the exhibition of the belladonna was 102, as against 114 during the use of acetate of

ammonia. On the fifteenth day the skin was sweating and of normal temperature.

CASE 24.—A moderately severe case. Constipation during the third week. Convalescence began on the forty-second day.

Ellen M—, æt. 6 (daughter of Catherine; see Case 14). Admitted about the fourteenth day of fever. Pulse 136; temperature 104°; epigastrium tender; tongue moist and coated.

Treatment.—℞viiss Succi belladonnæ, sextis horis, from the fourteenth to the fiftieth day. Poultices to the abdomen. ℞x Tincturæ opii per rectum on the twenty-eighth day.

Progress.—The bowels were costive till the twenty-second day. From this date to the thirty-fourth day the diarrhœa was severe, the abdomen tumid, and on one or two occasions there was bilious vomiting. On the fortieth day she had the first consistent motion. Convalescence began on the forty-fourth day. On the fiftieth the bowels were acting naturally, the tongue was clean and moist, and there was hunger. She left the hospital well on the sixty-second day.

The daily average of the pulse from the fourteenth to the forty-fourth, when it had descended to 88, was 108. From the fourteenth to the twenty-ninth day the tongue was dry and brown; for the next six days it was merely dry or dryish, and thenceforward moist; and on one of these days there was vomiting. There was no delirium throughout.

CASE 25.—A case of ordinary severity. Convalescence on the thirty-second day.

Ellen S—, æt. 13, was admitted on the fifth day of a febrile attack, attended with headache and severe pains in the limbs. On the sixth day she was drowsy. Temperature 102·4°; tongue moist and coated; pulse 120; and the bowels confined. The constipation continued until the ninth day, when the bowels become loose, and rose spots appeared on the abdomen. During the next two days the enteritis was fully developed. Up to this time she took acetate of ammonia the pulse ranged from 120 to 100, and the tongue was moist and coated.

Treatment.—From the ninth to the twenty-third day she took ℞xxx Succi belladonnæ, quartis horis.

Progress.—On the tenth day the pulse was 116, as on the ninth, before the belladonna was given. On the two following days it decreased to 112, and next day to 92. On the fifteenth and sixteenth days it rose to 104, and then gradually declined to 88, the number on the twenty-third, the day of convalescence. The daily average of the pulse for seven days before the use of the belladonna was 115; the average for fourteen days during its use was 100. The diarrhœa attained its maximum on the thirteenth, fourteenth, and sixteenth days, when the motions were watery and very frequent. The tongue was moist throughout the illness: it was coated with white fur up to the tenth day, and then gradually became clean. She took full diet on the thirty-second day.

CASE 26.—*A severe attack, complicated with broncho-pneumonia.*

Relapse on the thirty-fourth day. Convalescence on the seventieth day.

S. L—, æt. 17. Admitted on the fifth day of an attack of fever, with acute pulmonary congestion; constipation; a moist, white, furred tongue, and moderate pyrexia. The symptoms of enteritis were developed on the twelfth day. The average of the pulse for the previous six days (fifth to eleventh day) was 115.

Treatment.—From the eleventh to the sixteenth day she took ℞xxx Succi belladonnæ, and thenceforward to the thirtieth day ℞xv, every six hours. Poultices were continually applied to the chest; and from the fourteenth day onwards ℥iv of brandy were given daily.

Progress.—From the twelfth to the eighteenth day there was severe diarrhœa and diffuse broncho-pneumonia, and the condition of the patient was critical, and she lay on the back with flushed cheeks, nearly apathetic, until the nineteenth day. On the fourteenth day the pulse was 132, the tongue parched, and there was delirium. Excepting on this day, the tongue was moist and gradually became clean. She was convalescent and took fish on the thirtieth day.

Analysis of the symptoms.—Diarrhœa continued until the nineteenth day; on the twenty-first and afterwards the motions were solid. Free expectoration occurred on the nineteenth day, and thenceforward declined.

The furred tongue became parched on the fourteenth day, but the following day and afterwards it was continually moist and nearly clean.

Free sensible perspiration appeared on the nineteenth day.

The pulse averaged from the twelfth to the thirtieth day 100. It reached its maximum of 132 on the fourteenth, and again on the nineteenth day.

She was delirious on the thirteenth, fourteenth, and fifteenth days.

On the thirty-fourth day there was malaise with epigastric tenderness and nausea; and on the thirty-sixth day a distinct relapse of enteric fever, with bronchitis on the forty-first, and she went through a repetition of her former illness. She convalesced on the sixty-fifth day; but, though very hungry, could not take meat diet without reproduction of diarrhœa until the seventy-seventh day.

In the second attack she was simply treated with acetate of ammonia. The pulse averaged during the twenty-eight days (from the thirty-sixth to the sixty-fifth) of the relapse 115.5. The tongue, as in the former attack, was for the most part clean and moist throughout. The pyrexia and other symptoms were rather more severe in the relapse than in the primary fever.

CASE 27.—A severe case, complicated with extensive pulmonary congestion. Convalescence on the fifty-eighth day.

Catherine K—, æt. 12. Had been ailing about three weeks before admission with “pain in the stomach and back and occasional looseness of the bowels.” The abdomen was full, the pulse 104, temperature 103°, and she was drowsy and apathetic.

Treatment.—She took η viiss Succi belladonnæ from the twenty-first to the fifty-first day, and for some time linseed poultices were constantly applied first to the abdomen and then to the chest.

Progress.—The day after admission (twenty-second day) she

had a semisolid, light yellow stool; the next day the abdomen was tense and tender, and there were three loose, ochre-coloured stools. On the twenty-fifth day pneumon-enteritis was fully developed, and she was in a typhous state. The respirations were forty-eight, and there was crepitation in the bases of both lungs. A copious rose rash on the front of the trunk, and slight epistaxis. The bowels were alternately loose and confined up to the thirtieth day, after which there was no diarrhœa and a subsidence of both the abdominal and pulmonary symptoms. She, however, continued in a typhous state, sometimes passing her evacuations in bed until the fortieth day, when she became fretful. Intelligence then rapidly increased, and she was able to take fish on the fifty-first day. The daily average of the pulse during the pyrexial state (the nineteenth day following her admission) was 108·3. The maximum (120) was attained on the twenty-eighth and twenty-ninth days. The tongue continued parched and covered with sordes up to the thirty-third day.

On the fiftieth day the temperature was normal, the pulse 84, the skin natural, and the tongue clean and moist.

CASE 28.—Fully developed enteric fever, with normal or nearly normal temperature and pulse throughout. Convalescence on the twenty-sixth day.

Emily H—, æt. 14. Had been ailing for a week before admission, and the last two days she had rigors, headache, sickness, and pains in the limbs. The temperature was 102·6°, the pulse 112. Respiration 28. Abdomen natural; no diarrhœa. Tongue moist and furred.

Treatment.—She took ℞ Succi belladonnæ, quartis horis, from the seventh to the twenty-sixth day.

Progress.—On the eighth day four or five rose papules appeared on the abdomen, and there were two loose, light yellow stools. Fresh rash appeared until the twenty-third day; diarrhœa continued rather profuse some days until the seventeenth day, and there was subsequent constipation. The pulse and temperature declined, and, as will be seen in the following table, were almost normal throughout.

	Temp.	Pulse.		Temp.	Pulse.
7th day .	102·6°	112	20th day .	97·6°	64
8th „ .	102·2°	104	„ evening	100°	
9th „ .	100·5°	100	21st day .	99·1°	92
10th „ .	100·6°	100	„ evening	98·4°	84
11th „ .	99·8°	84	22nd day .	99·1°	92
12th „ .	98·4°	76	„ evening	98°	84
„ evening	100·2°	86	23rd day	84
13th day .	98·4°	88	24th „ .	98·8°	100
14th „ .	98°	72	„ evening	98·4°	96
„ evening	100·2°	80	25th day .	99·8°	96
15th day .	98·4°	80	„ evening	99·6°	104
16th „ .	100°	92	26th „ .	98·4°	84
„ evening	100·1°	76	27th day .	98·4°	84
„ „	99·3°		„ evening	99°	
17th day .	98·6°	84	28th day .	99°	96
„ evening	101·8°		30th „ .	99°	100
18th day .	98·4°	84	„ evening	97·5°	96
19th „ .	99°	84	31st day .	„	„
„ evening	100°	86			

The tongue was moist and nearly clean throughout, and the mind was clear. This and Case 27 were two of fourteen patients who were admitted into the hospital from a school at Highgate, where enteric fever was for a time endemic.

The preceding abstracts of cases have been taken in the order in which they appear in my note-books. They will be found sufficient, I think, both as to number and variety of the symptoms, to illustrate the use of belladonna in this disease. Owing to the various complications and accidents which attend the course of enteric fever, it is perhaps more difficult to estimate the value of a given drug in this disease than in any other, and a correct estimate can only be formed from a large number of cases.

Analysis of the foregoing cases with reference to the degree of development of the particular symptoms, shows the following results:—1. As to the pyrexia. It appears that *the rate of the pulse and the degree of temperature* were never, as a rule, increased, but,

on the contrary, both these symptoms uniformly declined under the use of belladonna. The daily averages of the pulse above given are, considering the severity of the cases, certainly low. My own impression is that the stimulant action of belladonna on the heart is converted in the pyrexial state into a tonic and, if not pushed too far, even a sedative influence on the heart and blood vessels generally; in other words, that it is a tonic and sedative to the sympathetic nervous system generally. This I take to be the fundamental explanation of its effects in the febrile state. By this action the capillary circulation is accelerated, the contraction of the vessels promoted, and thus the arterial tension which attends congestion of the parenchymatous organs is relieved, and a load at once removed from the heart. Diminution of temperature is the direct consequences of these changes.

As the result of the prolonged use of belladonna after the cessation of the pyrexial stage, I have noted an irritable debility of the heart as if it had been exhausted by over-stimulation, and the nervous system has also shown a participation in this effect. Thus, with reference to the heart, a young woman, æt. 18, for example, continued to take a moderate dose (m̄x) of belladonna juice every four hours for nine days after convalescence, and as she reclined on her bed in a state of rest, the pulse numbered 60 and the respiration 16. With the finger still on the pulse, and after three or four deep inspirations, it rose immediately to 88. In these cases there is generally a little hurry and excitement, and a liability to flushing when spoken to. These, the usual consequences of prolonged fever, are, I believe, exaggerated by the abuse of belladonna. When taken in conjunction with the fact stated in the outset, it appears that the beneficial use of belladonna lies, with narrow limits as to dosage, and that vigilance must be exercised lest these limits be exceeded.

As to *delirium*. Except in a very small proportion of cases, I have not observed that this symptom in enteric fever is increased by belladonna, and I have never withheld the drug on account of delirium. In the three or four cases referred to, I have not always been sure that the delirium and belladonna have stood to each other in the relation of effect and cause. Speaking generally, the effect of the belladonna was to diminish

the insomnia so frequently present, and it may therefore be said to have a slight hypnotic and calming effect on the cerebro-spinal system.

As to the condition of the *tongue and skin*. One of the most noticeable effects of belladonna in the pyrexial condition is moistening of the tongue. In many of the cases above recorded the patient had been admitted with a dry, parched tongue, and it has become soft and moist after a few doses of belladonna, and has remained so during the further progress of the disease, notwithstanding, in many cases, an increase in the severity of the general symptoms. No particular effect on the skin was noted, but those critical sweats, attended as they commonly are in this disease by a copious eruption of sudamina, occurred as frequently and abundantly as when no belladonna was given (see, *e. g.* Cases 7, 10, 23 and 26).

As to the *alvine discharges*. As far as I could determine, the diarrhœa was not directly influenced either way; but in those cases in which the belladonna was given from an early stage of the disease, it appeared to me to be of shorter duration. The tendency to hæmorrhage in like manner appeared to be uninfluenced—directly at least. It happened in 12, or about 5½ per cent. of the cases treated. The point to which I particularly directed my attention was the reappearance of bile in the stools, and I have a decided impression that the liver was restored to a healthy action at an earlier date in the belladonna cases than in those treated by ordinary remedies (such as chalk, catechu, dilute sulphuric acid, and opium). This was indicated by the yellowish-brown colour of the fæces, and sometimes by bilious vomiting about the third week of the disease; and in many cases by an early cessation of the diarrhœa and the formation of solid, normal-coloured fæces.

Passing from these particular indications, I will now give the general results as indicated by the proportionate mortality.

The total number of patients treated with belladonna during the whole or only a portion of their illness was 228, of whom one half were females.

The average age was 18 for both sexes, and the average duration of residence in the hospital about 37 days.

Of the total numbers 28 died, *i. e.* 1 in every 8·14, or 12·28 per cent.—a low rate of mortality, but susceptible of being placed in

a more favorable light still, as the following facts will show. The belladonna treatment was soon applied indiscriminately, and only withheld when the increase of delirium, urgent pulmonary symptoms, hæmorrhage, or perforation rendered the use of other remedies imperative. Belladonna was therefore given to a number of patients admitted in the third, fourth, or even fifth week of their disease, and of some of whom it may truly be said that they were brought into the hospital to die. This will appear from the following brief summary of some of the fatal cases included in the mortality estimate given above.

1. Martha H—, æt. 21, was ill a month before admission, and died ten days afterwards. The lower end of the ileum was loaded with thick-margined congested ulcers. The right lung was bound down by old adhesions, and the upper lobe as well as the lower lobe of the left lung spleenified.

2. Catherine M— (see case, p. 215) had almost completely recovered from the intestinal lesion, the fæces being normal, and all but one or two ulcers healed, when she sank of sheer inanition.

3. Charity G— (see case, p. 218). In this case general tuberculosis was undoubtedly fully developed before she was admitted into the hospital, of which she was an inmate only eleven days.

4. Rachel S—, æt. 12, was admitted at a late period of the disease in a typhous state, with sordes on the teeth and a pulse of 140. She took belladonna only two days, and died five days afterwards.

5. Mary J—, æt. 23, was also admitted at a late period of the disease in a typhous condition, with sordes and active delirium. She took belladonna two days only, and died five days after admission.

6. Elizabeth D—, æt. 16, was also admitted in a typhous condition, and with sloughing of the labia pudendi. She took belladonna only two days, and died on the tenth day of her sojourn in the hospital.

7. John C—, æt. 14, was admitted in the fourth week of his illness, delirious, and with a pulse of 130. He died seven days

afterwards of perforation, which appeared to have occurred before admission, for there was no indication of any fresh abdominal lesion afterwards.

7. James B—, *æt.* 19, was admitted at the end of the fourth week of his illness. He took belladonna only four days, and died on the fifth day after admission. The lower lobes of both lungs were in the stage of red hepatisation; angry, bleeding ulcers still occupied the sites of the lower Peyer's patches.

9. Leonard D—, *æt.* 10, was admitted in a prostrate condition in a late stage of the disease, and died after forty-eight hours, when it was found that the pericardium was wholly adherent (old adhesions), the valves of the left heart had been the seat of previous rheumatic endocarditis, and the ulcers of the ileum were nearly healed.

How far these cases should be excluded in calculating the death-rate and in determining the remedial influence of belladonna in enteric fever, or rather that concurrence of pulmonary and enteric inflammation, which I have elsewhere termed pneumonenteritis, I will leave the reader to determine. I have felt it proper to bring forward every case in which belladonna was given, but it will at once be conceded that Cases 4, 5, 6, and 9 just specified should be excluded. This would reduce the death-rate to 1 in 9·3, or 10·71 per cent.—a most satisfactory result.

Six of the whole number died of perforation of the ileum. Pneumonia was the immediate cause of death in a considerable proportion of the remainder.

The belladonna treatment was continuously pursued throughout two years, *viz.* from November, 1869, to November, 1871; and during this period I find that 131 other cases of enteric fever in my practice were treated in the usual way.¹ From this it might be inferred that a selection was made of the cases as to the particular treatment to be adopted, but this was not so, but the variation was determined by several causes; thus, in a number of cases enteric symptoms were undeveloped for some time, during which the nature of the case was somewhat doubtful, and in these cases the treatment first adopted was continued; or a sudden outbreak of diarrhœa or hæmorrhage called for astring-

¹ All these cases came under my care in the London Fever Hospital.

gent remedies. At one time the supply of belladonna was exhausted and not immediately renewed. At another time a temporary change in the resident medical officers in charge of my patients led to the adoption of the ordinary treatment, which I was glad to continue, in order that I might have a number of concurrent cases with which I could compare those treated by belladonna.

These cases, 131 in all, that is rather more than half the number of the belladonna cases, afford the following statistics:— 20 or 1 in 6·5 died, thus giving a death-rate of 15·26. But 3 of these died within twenty-four hours of their admission into the hospital, thus reducing the mortality to 13·28. This is a low rate as compared with that of the whole number of patients suffering from enteric fever admitted into the London Fever Hospital during a period of twelve years (from 1848 to 1859). The mortality for this period was 17·26, and after deducting the deaths which took place within forty-eight hours after admission, 15·82.¹

The question suggested by my own figures is, whether the diminished rate of mortality in the cases under ordinary treatment should be attributed to the use of belladonna in the greater proportion of the whole number of cases?

This is a question which must be decided by a further experience of the drug. I think I have adduced sufficient evidence to show that the use of belladonna in enteric fever has been so far attended with good results; and that the theory of its action, which I have propounded at the outset, has been borne out in practice.

¹ Murchison, 'Contagious Fevers of Great Britain,' 2nd edition.

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At one time the supply of belladonna was not so abundant as it is now. At that time a change in the medical officers in this ward was followed by the adoption of the treatment, which was not to be done, in order that I might have a number of treatment cases and which I could compare the results of.

It is in all, that is rather more than 100 cases of the disease, all of the following kind: 100 or 1 in 100, that is a death-rate of 100% in 100. There had been many deaths of their children in the hospital, this being the mortality to 100%. This is a low rate as compared with that of the whole number of patients entering from outside, who are admitted into the London Hospital during a period of twelve years from 1885 to 1900. The mortality for this period was 17.5% and after deducting the deaths which took place within forty-eight hours after admission, 10.5%.

The question suggested by my own figures is, whether the abnormal rate of mortality in the case under ordinary treatment should be attributed to the use of belladonna, or to the proportion of the whole number of cases?

This is a question which must be decided by a further extension of the data. I think I have a good deal of evidence to show that the use of belladonna is entirely harmless when used with good results; and that the theory of its action, which I have propounded at the onset, has been found not to be groundless.

J. H. H. H.