pain and vomiting. The symptoms became more urgent as the day advanced; and, in spite of treatment, she sank and died at one o'clock on the morning of the 23rd, after an illness not exceeding twenty-two hours.

The following were the *post mortem* appearances. The abdomen was distended; there were four pints of bloody serum in the cavity of the peritoneum, but no lymph nor any appearance of inflammatory exudation. The stomach and small intestine, to within a foot of its termination, were distended with flatus. There was congestion of the small intestine, beginning about the end of the jejunum, and extending to within a foot of the cæcum, gradually becoming more and more intense until the point named, where it ceased abruptly; immediately above which point the colour was a deep purple. This was found to be caused by a narrow cord-like band, apparently a part of the lower right corner to the omentum, encircling tightly a loop of gut and mesentery, comprising a large part of the ileum; the last turn involved being abruptly twisted upon the constricting band. The last foot of the ileum (being the part beyond the stricture) and the great intestine were pale, healthy, and contracted.

Here, also, the same essential features presented themselves as in the last case. I have selected, as a specimen of this condition, a case of internal strangulation instead of strangulated hernia; because, in the former case, the symptoms pass on unchecked and unaltered to their fatal termination; whereas, in the latter, the appearances are materially modified by the operation, which may remove the condition of ileus to substitute (in fatal cases) peritonitis in its stead.

As a contrast to these, may be cited the following case of intussusception where, in addition to ileus, inflammation was present, depending, however, on another cause.

OBSERVATION III.—*Attack of Vomiting and Constipation, with Abdominal Tenderness; Death in Four Days; Intussusception, Perforation, Peritonitis.*—A male, aged 34, labouring under phthisis in its last stage, was attacked with vomiting and constipation; the abdomen was tender on pressure, but none of the symptoms were very urgent. He had been labouring under diarrhoea for some time previously, with occasional attacks of vomiting; the vomited matters being of a decidedly green colour, and containing sarcine in abundance. He gradually sank, and died in four days.

The following were the *post mortem* appearances. The abdomen was distended. The intestines were coated with freshly effused lymph, lying chiefly between the convolutions; the peritoneum was somewhat reddened. The jejunum and upper half of the ileum were much distended. About the middle of the ileum, was an invagination of about two feet of intestine, which was intensely congested, and contained coagulated grumous blood, which was also found in the lower part of the ileum. The congestion extended but a very short way up the gut, and not at all below; the lower part being pale and flaccid. In the jejunum, were numerous rather large ulcers scattered widely apart; the same appearance extending into the upper half of the ileum, but not into the lower. In the portion of gut forming the sheath to the invaginated part, a large ulcer had given way, causing perforation; but, from the blocking up of the interior by the invaginated gut, very little effusion of the contents had taken place.

Here the peculiar symptoms of ileus were by no means urgent, which corresponded to the small extent in length along the gut of the congestion found after death; and so, notwithstanding the access of peritonitis, doubtless set up by the perforation, and notwithstanding the weak condition of the patient, already broken down by phthisis and diarrhoea, death did not occur for four days.

From these cases—and others might be cited—it would appear that inflammation is no necessary or even frequent concomitant of ileus, certainly no necessary prelude to a fatal result; while the *post mortem* appearances point clearly to the mechanical stoppage of the circulation as the cause of death. These appearances are precisely identical with the phenomena produced by tight ligature of a limb, or of any portion of the body; the venous circulation is brought first and completely to a stand; thus throwing the blood back upon the capillaries and arteries, which last, not being so easily completely compressed, may continue for a short time to carry a little blood into the part. The gorged vessels endeavour to free themselves of their contents by the effusion of serum and blood, or of blood alone; but the stagnation still continuing, the whole circulation of the part comes permanently to a stand, and gangrene results. One point, however, in the state of parts in ileus, deserves especial notice. It is not alone the part actually strangulated that is loaded with blood; but this loading extends for a considerable distance upwards, as if the stoppage of the circulation affected not only the part directly implicated, but caused also an impediment to the circulation in the intestine for some distance above. When pressure is put upon a vein, we find that the blood is thrown back only on those parts

drained by that vein; and it might, therefore, have been concluded *à priori* that, considering the large number of veins returning blood from the intestinal coats to the trunk of the superior mesenteric, the blocking of one of them would not necessarily have interfered with the circulation in its neighbours; but the above observations show that it does do so to a very considerable extent. This can scarcely be produced simply by the spreading of irritation, for, in that case, the parts below, as well as those above, should have shared in it; and the only reasonable explanation that suggests itself is that, besides the current of venous blood returned direct, by the various small veins in the mesentery, into the trunk of the superior mesenteric, the very free anastomosis by the side of the gut permits a steady downward flow of blood parallel to the intestine; the circulation being only finally balanced, as it were, when we near the termination of the great intestine. On such a supposition, it is easy to understand the appearances produced, as the blood would thus, in all cases, be thrown back on the parts above the stricture, gorging these, and leaving those below pale. If, however, this supposition be not admitted, why should not the congestion in Case I have been limited to the one or two veins actually compressed, instead of extending many feet upwards? Or why, in Case II, should the lowest part of the loop have been the most congested, instead of having this condition equally spread over the whole part included in the stricture? In this last case, the idea of the gravitation of the blood in the congested part having any share in the result is totally inadmissible, as the beginning and the end of the loop involved (being the parts least and most affected respectively) were on the same horizontal level; and the most dependent part, being the middle of the long loop, was not nearly so much affected as the part farther down the gut, although this last was above it in level. The great length of the loop in this case afforded a much better opportunity of tracing the actual condition of parts at different points, than does the short loop usually found in a hernial sac.

The idea of some such peculiarity in the intestinal circulation as that here supposed is, to a certain extent, borne out by what is seen in animals. If a small animal be killed, and the abdomen immediately opened, before the blood in the smaller vessels has ceased to circulate, and the mesentery be spread out under the microscope, the blood will be found still flowing there, although somewhat slowly, and the current will be found setting in all the smaller veins parallel to and down the line of the gut. From the foregoing observations in ileus, I consider it probable that this may also be the case in man; and, should this supposition prove correct, it would also explain the absence of valves in the veins of the alimentary canal.

OBSERVATIONS SUGGESTED BY THE STUDY OF CASES OF CATARACT EXTRACTION.*

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GRANTING that all the precautions which I have indicated be taken, there are, nevertheless, many cases where the eye would doubtless be lost through the attempt to secure too much; and there is abundant evidence to prove that the indiscriminate adoption of the most carefully managed flap would be fatal to many cases that are saved by either a combined or a preliminary iridectomy. Thus, Mooren, in his excellent paper on Extraction by a New Method (portions of which I translated in a former essay) demonstrated, at least to his own satisfaction, that the small portion of iris which corresponds to the flap, whichever section be employed, is the portion which first takes on inflammatory action, and is not only the cause of iritis and the minor sequelæ of such disaster, but is really the initiation of that series of changes which cause supuration of the flap, and end in panophthalmitis and total loss of the eye-ball. He illustrates this observation by several interesting cases, which space will not permit my now quoting to you; but which tend to show that the bruising of the small segment of iris corresponding to the flap, caused by the passage of the lens, is the proximate cause of iritis, and that the inflammation so caused is followed by supuration of the flap as a direct consequence. This important observation induced Mooren to excise a small portion of iris upwards or downwards, according to the position of the section, some weeks before extracting in the ordinary way. He was thus enabled to save several most unpromising cases; and I have verified the truth of his doctrine by the result of my own practice, as may be seen by several cases which I reported in the *Ophthalmic Review*. Unfortunately, the division of the operation of extraction into two parts was always a serious objection to Mooren's pro-

* Concluded from page 570 of JOURNAL for November 28th, 1868.

cedure, and at one time I endeavoured to overcome this by making an iridectomy through a very small incision, extracting half an hour afterwards, in the ordinary way when the aqueous humour was re-secreted.

Shortly afterwards, however, I operated upon an aged, feeble patient, who suffered from most severe paroxysms of asthma. The operation on the right eye was perfectly successful, and caused so little inconvenience that she was most desirous to have the left eye operated on. This I did; and, some time after I had left her, during a fit of dyspnoea and coughing, accompanied by a gush of aqueous humour and spasm of the lids, the flap was completely reflected; and, as she made no complaint, it remained unnoticed until the eye was opened on the fifth day. (The case is reported in the *Ophthalmic Review*.) This reflexion of the flap determined me to carry out more generally my linear flap method, and, if possible, to get rid of such a source of danger as was involved in an incision of such magnitude; and I therefore endeavoured to ascertain whether extraction might not be accomplished through a wound so small that there would be no risk in such manipulation of the eyeball as would be necessary to facilitate the various steps of the operation, and yet large enough to permit the exit of the lens without the introduction of any instrument into the eye, or consequent risk of those disastrous results which I had sometimes seen to follow the lifting out of the lens with Schuff's spoons. I was then satisfied that, with the enlarged pupil and extended surface for operation obtainable either by a combined or a preliminary iridectomy, the large flap was unnecessary; and that an extended flap-like incision, comprising little more than one-third of the corneal surface, if made well back in the corneo-sclerotic junction, would suffice for the ready exit of the lens, without the use of any traction-instrument. I found also that a wound flap-like in form yielded more readily to the advancing lens than one more strictly linear in its character; while it was still sufficiently slit-like to close without artificial apposition, strong enough to resist protrusion, and too resilient to permit accidental reflexion.

I may mention that I had fully worked out this method, and demonstrated its advantages, before I had heard of Professor von Gräfe's modification of linear extraction, and before any account of his experiments had been published. As you will perceive, however, from the diagrams, that the operations are essentially different, I need not say more on that score.

In my first operations, I used a ground-down cataract-knife, reduced to about the size of the secondary cataract-knives sold in most cases of ophthalmic instruments. Latterly, I have used Mr. Critchett's iridectis and Dr. Bader's smallest sized iridectomy-knife; making an incision a few lines in extent at the summit of the cornea, withdrawing a portion of iris, and cutting it off; then incising the capsule, and enlarging the wound to the requisite extent to the left and the right with a similar knife with a blunt point, made for me by Mr. Coxeter. As the conjunctiva is only to a very slight extent implicated, there is usually very little trouble from hemorrhage. Should it occur, however, it is well to arrest it by slight pressure applied through the medium of a pad of cotton-wool. Care must be taken to excise the iris freely at the angles of the incision, as small portions are very apt to prolapse in this situation. If the anterior chamber become filled with blood, it should be sucked out, and gentle pressure applied, so as to arrest the flow. The lens usually comes forward on the application of slight pressure to the globe, while the posterior lip of the wound is gently pushed back with the curette. Cortical fragments may be extruded by manipulation; but, if this do not suffice, it is advisable to suck them out, and to remove carefully any pieces of capsule that remain. Rest for a few days, with partial exclusion of light, is all the after-treatment required; and the great majority of patients may be discharged on the seventh day. I published a full description of this method in the *Edinburgh Medical Journal* for February last, and appended reports, with names and addresses, of fifty-four patients operated upon by myself in succession (without selection), in only one of which was the eye lost from suppuration of the flap; this occurred in a patient eighty-five years of age, who had been blind for twelve years, and suffered from shrunken and irritable globes.

I may mention that the operation I have described has practically, in this country at least, superseded both Schuff's and Von Gräfe's. The feeling that Von Gräfe's incision was too far back seems to have been very general. The bleeding from the wounded conjunctiva, often filling the anterior chamber, was a serious objection. The swollen and infiltrated conjunctival flap was a source of embarrassment in the subsequent steps of the operation; and the risk from loss of vitreous humour has always appeared to me very great. Schuff's method, or the extraction of the lens with a spoon through a small incision, was frequently attended with disastrous results. An eminent surgeon, on first trying it, lost two eyes in succession; and I knew another gentleman who had

three failures one after another. Mooren, with this method, also lost ten eyes in thirty operations. Mr. Bowman and Mr. Critchett, however, brought the operation to great perfection, and published some excellent results; but they really now coax out the lens without passing any instrument into the eye, much after the method I recommended upwards of three years ago; so that Schuff's operation is practically abandoned, or used only in exceptional cases.

There are certain cases of cataract in which, whether from their diffuse form or immaturity, or from unusual activity of the intracapsular cells, it is impossible to avoid the formation of secondary cataract, if the capsule be not removed at the time of extraction, however clear the pupil may appear after removal of the lens. Thus, in patients blind from fully formed cataract in one eye, with the other failing, the operation on the first eye is often at once successful; while a secondary cataract supervenes when the best eye is operated on. In these cases, it is necessary to extract the lens with the capsule entire, in order to escape the annoyance of secondary cataract and protracted recovery. Pagenstecher, who has extensively adopted this method in all manner of cases, has secured most excellent results, both as to the progress of the case and ultimate acuteness of vision. He uses a full sized Beer's knife, entered in the sclerotic at the transverse meridian of the cornea; and makes a large flap downwards. The knife, being entered and emerging in the sclerotic, leaves a conjunctival band after the division of the harder tissues is completed. This band he leaves until a large piece of iris has been withdrawn and excised. He then snips it across with scissors, and endeavours to extrude the lens by pressure; failing which, a large spoon is slipped behind it, and it is withdrawn. The hyaloid membrane is, of course, very apt to be ruptured during the progress of these manœuvres; and it is, therefore, necessary to avoid even the slightest pressure on the eyeball. Hence Pagenstecher never permits the eye to be fixed in any way, either with forceps or fingers. He gives chloroform very fully; and, as the eye is always, during anaesthesia, turned completely upwards, the lower section is the only one that can be used. This is the great point in his operation, and one that I have not seen before alluded to. It is a singular fact that, disastrous as have been, in many instances, the results of inserting the spoon into the eye when the capsule has been opened and portions of membrane and lens-matter left behind, it is very innocuous when the lens and capsule are removed by it entire.

Pagenstecher's operation leaves a large slit in the lower and most exposed portion of the iris, all to one side, which is extremely objectionable; and the wound appears to me unnecessarily large. The intervention of the couch and body of the patient makes it difficult sometimes to operate from below. Pressure is very apt to rupture the hyaloid; and, in the absence of all fixation, the proper introduction of the spoon and withdrawal of the lens is sometimes attended with difficulty. In adopting his principle, therefore, I have abandoned all intention of squeezing out the lens, and determine to adopt my own form of incision, slightly enlarged, and, indeed, carrying out each step of the operation precisely the same as in my linear flap method, with the exception of the laceration of the capsule. Having performed iridectomy and enlarged the wound, I seize the eye with forceps at its lower margin, and make slight pressure, so that the lens is inclined forwards, and in a favourable position for the introduction of the spoon; this I then slip behind, and extract the whole entire, supporting the cornea with one finger. Such cases, as a rule, do remarkably well, give very little anxiety afterwards; and the results as to vision, as I shall show you, are excellent. The operation is not admissible in young people, in whom the capsule and suspensory ligament are remarkably tough, so much so that any attempt to remove them entire drags on the ciliary processes with disastrous results, and may even detach the retina. It is not necessary to run the increased risks of loss of vitreous humour, etc., which this operation involves in fully mature cataracts occurring in aged persons; but it is a great boon in those cases of immaturity, degeneration, or diffuse glutinous cataracts, where experience tells us that opening of the capsule will be followed by exudation, proliferation, and blocking up of the pupil by secondary cataracts. The large wire spoon, which I had made for this purpose, answers admirably; and, as it occupies less space than any other, the risk from pressure is considerably diminished.

Space will not permit any allusion to soft or other forms of cataract. I shall, therefore, merely conclude by thanking you for your kind attention to a subject which, I fear, is too special to interest many present.

[The paper was illustrated by diagrams showing the various methods of extracting; and, at its close, several patients who had undergone double extraction (some evidently, from great age and marasmus, most unfavourable subjects) were introduced in illustration of the author's views.]