early drainage—the too common practice of the average practitioner and a fault from which the general surgeon and some railroad surgeons are not altogether free.

DISCUSSION.

DR. W. RUMML, Cedar Rapids, Iowa—I desire to say a word or two in reference to the use of formalin, in connection with the paper of Dr. Lord. I have been using moist formalin dressings for some time, and so far they have proved eminently satisfactory. I use $\frac{1}{2}$ per cent. solution of formalin for saturating sterilized gauze, and the gauze is applied moist. In this way drainage is favored, and the oozing from the wound cared for by the dressing and does not macerate the wound area.

DR. EDUARD BOECKMANN, St. Paul, Minn.—I was very favorably impressed with the remarks of Dr. Lord in reference to drainage. I have tried to do ideal surgery without resorting to drainage, but the older I grow the more I come back to treatment of wounds with it. As regards formalin, I have had no surgical experience with it. I have always considered it a good antiseptic, just as efficient as any other material for this purpose, but I do think its germicidal properties have been greatly overestimated. Formalin has been recently recommended for the purpose of preparing the skin, and in the opinion of prominent surgeons it is the best antiseptic we have for disinfection of the site of operation, and I should not wonder if formalin, used as a dressing, will prove as efficient as many other agents we now use. I rather believe it is a good remedy for dressing wounds, and will certainly try it when opportunity presents itself.

DR. J. P. LORD, closing the discussion—If I can see a case of railroad injury in its incipency, or very soon after its occurrence, I do not believe the use of formalin either for the purpose of submersion or irrigation of the part is necessary. Thorough drainage with sterilized water may prove sufficient; but in cases where the wound is already foul, we have a valuable agent in formalin. Bichlorid of mercury, which was formerly so much used, I do not usually apply as a moist dressing, because there is considerable albuminous secretion which soon forms the albuminate of mercury, and this is inert as an antiseptic. In such cases I am a friend of carbolic acid, unless there is too great danger from absorption. My experience with formalin dates about two years, during which time I have used it extensively in clearing up unclean wounds of various kinds, and particularly necrotic ones, and where a limited space is to be covered I use it as strong as 2 per cent. of the forty volume solution, but that would make it much less than its percentage would indicate. I have found that even one-half of 1 per cent. was sufficient to devitalize granulations during that period of progress of the wound when granulations were so desirable. It exerts a much more powerful influence on the tissues than our first experiences led us to believe. I have seen granulations destroyed repeatedly by the application of 1 or 2 per cent., used for two or three hours. I have seen granulations destroyed by washing the part with a 2 or 4 per cent. solution. In a day or two thereafter I have seen a tanned necrotic layer appear on the surface, which must slough off before further progress can be made. The remedy should be used with considerable caution and in very weak solutions; $\frac{1}{8}$ of 1 per cent. is the usual strength now used by me.

I recently had a case in which there was a most intense form of infection following a railroad injury, it being necessary for me to extend the palmar incision up through the palmar fascia, to open the sheath of the flexors clear to the elbow. The septic condition extended almost to the axilla, and it was evident that the patient would succumb if relief was not afforded, consequently the whole palmar surface of the man's hand, wrist and arm was laid open; the diseased tendons were cut away, and the wounds were packed with formalin as a dressing, shortly after which there was a very material reduction in the temperature of the patient, and it was really remarkable to see what formalin did in this particular case. Formalin was used as often as it was deemed necessary. Here is one case of infection where formalin acted in a marvelous manner.

THE DIPLOMATIC representative of Bulgaria at Paris during the Exposition year is a physician, Dr. Kolotovitch.

TREATMENT OF GUNSHOT WOUNDS OF THE ABDOMEN: SOME NEW STATISTICS.*

BY H. H. GRANT, M.D.

LOUISVILLE, KY.

The surgery of gunshot wounds of the abdomen, which has been for some years pretty well settled to the satisfaction of the profession, received something of a shock by the report of the surgeons who served in the late war with Spain (see *THE JOURNAL* for July 9, 1898, and the published report of the last meeting of this body.) yet the inferences, and indeed the conclusions, affect surgical judgment to a considerable degree. It was because the settled data of private surgery were so much at variance with these reports that I deemed it justifiable to inquire a little further into the subject. The result of the investigation by Klemm shows, in an analysis of 152 cases, that even those in whom penetrating wounds in the abdomen were established, who did not die of immediate effects, eventually nearly succumbed to exhaustion from sepsis and later suppuration. The meaning of this is that, practically speaking, all penetrating gunshot wounds of the abdomen, untreated by surgical repair of the lesion, die either of hemorrhage, peritonitis or sepsis. It is not to be denied that a small bullet, in certain situations, pursuing an unexpectedly favorable course, may occasionally fail to produce a fatal injury, but it will be seen from the statistics I have reported, as well as those of Klemm, that such favorable results did present in only about 6 per cent. of over 400 cases. The complete analysis of the subject, made by Dr. W. E. Parker, settled, by the comparison of the reports of a large number of reliable operators, the following points:

The mortality after operations done in the first seven hours after injury is 52 per cent., as against 64 per cent. for operations at all periods. But a study of the table of Parker shows such variations in the mortality succeeding complicated and uncomplicated wounds of the various viscera all of fatal character without operation, as to indicate that, in uncomplicated wounds in some situations, the early operator will often save 75 to 80 per cent. of what would otherwise be fatal cases. His table also shows that of sixteen operations done, in which no intraperitoneal injury was found, three died, one from an overlooked perforation, and two from peritonitis due to infected blood clot—the fatal complication on which Klemm lays so much stress. Thus we see that no death was referable to the operation even as a contributing cause. It also appears, that in considerably over a hundred cases—the exact number is hard to get at in the table, as in the classification it was necessary to duplicate often—there was no reported recovery from operation done twenty-four hours after injury.

There is still one other important deduction from this invaluable paper, supplemented as it is by many other sources of testimony: almost all operators agree that there is no reliable symptom of perforation or mortal lesion in the operable hours after injury. It will be interesting to review these facts in connection with the study of the reports I shall present a little later. Notwithstanding these, and others of an equally convincing nature, it is still published in current medical literature, and still finds a place in valuable text-books on surgery, that a considerable per cent. of untreated gunshot wounds of the abdomen will recover; and that treatment by operation may be deferred until symptoms indicate perforation.

Confronted by this state of things I decided to send

* Read before the Southern Surgical and Gynecological Association, New Orleans, La., 1899.

out the following questions to over a hundred prominent surgeons of this country: 1. In what proportion of operations, after tracing the ball into the abdominal cavity, have you failed to find perforations of the hollow, or dangerous wounds of the solid viscera? 2. In what proportions of fatal operations have you found, post-mortem, evidence of unsecured perforations or unchecked hemorrhage? 3. In what proportions of both fatal and recovered cases was there evidence of peritonitis at the operation? 4. How often have you had reason to believe, after laparotomy on a traced wound, the chances of life are lessened by operation? 5. Recoveries. 6. Deaths.

I have received in reply reports of 253 operated cases. I have preserved the originals, which are at the service of any investigator, but notable names and cases will be published in full. I have to thank the following gentlemen for the courtesy of response: Drs. W. L. Robinson, W. O. Roberts, J. B. Bullitt, C. A. Wheaton, J. Ransohoff, T. J. Crofford, James Dunn, L. M. Tiffany, E. Laplace, A. T. Bristow, R. Douglas, H. H. Mudd, W. E. Parker, Joseph Geiger, F. McRae, W. E. B. Davis, J. Davis, A. M. Vance, George Crile, J. B. Murphy, C. A. Powers, D. Barrow, L. Freeman, L. P. Nolte, A. J. Ochsner, H. B. Delatour, J. G. Sherrill, F. Samuel, M. H. Richardson, R. E. Fort, W. L. Rodman, H. M. Taylor, P. S. Conner, B. M. Ricketts, C. C. Commegs, W. Potter, J. V. Brown and A. H. Cordier.

I have in no case made use of any other report than the direct answer. I have not endeavored to compare the mortality with reference to the organs injured nor to the time of operation; not alone because both of these points are covered by the tables of Parker and Coley, but particularly because I wished to determine the propriety of exploration in all cases of penetrating wounds prior to the development of general peritonitis. The great majority of these cases are not included in any published tables, and many of them are accompanied by notes indicating that the operation was made early.

An analysis of the reports develops a number of most important and interesting facts. The mortality in the whole number is about 52 per cent.—the best results reported in any published table, an indication that the prognosis is improving with the more energetic measures of treatment. In 21 of the 253 operations neither perforation nor serious hemorrhage was found. It is to be doubted whether so large a number of *traced* penetrating bullets could fail of more serious injury, and there is a presumption of faulty diagnosis in some of them. However, they all recovered, so the operation did no harm. In 28 of the 133 fatal cases there was found, post-mortem, the evidence of faulty surgery in the presence of unsecured perforations or hemorrhage. If we omit the 21 non-perforated, and the 28 unsecured, the mortality is 51 per cent. of the whole number. Of the recovering cases, 11 are reported to have had notable peritonitis at the operation—some 6 or 8 others report traces. This may be taken to indicate that about 5 per cent. of patients with severe peritonitis may be expected to recover after laparotomy. In answer to Question 4, three surgeons confess to having done harm by the operation. These were men of experience. One thinks the operation hastened death by shock, as the source of hemorrhage was not discovered. As this patient must have died anyway, it is not a figure in the calculation. The second states that though the section disclosed a perforating wound of both walls of the stomach, there was no extravasation until the organ was pulled forward at the operation. Though this conclu-

sion be correct, no surgeon would hesitate to do a section when he knew a perforating wound of the stomach existed. It is such wounds that Klemm declares death follows from sepsis and abscess in those who survive the immediate injury. The explanation of the third exception is practically the same. Thus the surgical conclusion is, fairly, that in no case was the result affected unfavorably by the operation. The following table, made up of the most favorable reports, by surgeons too well known to be misunderstood about statistics, shows what may be accomplished in a considerable number of cases in good hands. Only those in which a lesion was found are included in this table.

Name.	R.	D.
Tiffany	3	4
McRae	2	1
Mayo	3	0
Ochsner	3	1
Douglas	4	1
Geiger	8	2
Dunn	2	1
Rodman	3	3
Delatour	3	2
Richardson	1	1
Nolte	9	6
LaPlace	13	7
Parker	5	7
Vance	3	4
Grant	4	1

The result is 67 recoveries and 41 deaths, giving a percentage of recovery in unselected cases, without regard to the time of operation, or to the organ injured, of over 61 per cent.—better than the strangulated hernia gave fifty years ago. At the last meeting of this Association I reported 4 cases with 3 recoveries—2 after resection of the intestine. Since then I have operated on but one, a negro man, seen fourteen hours after injury. Three perforations of the ileum were found, one evidently being made by the penetration of a knuckle of a bent intestine. Intense abdominal distension with pain set up on the second day, the pulse 130, the temperature 106. The bowels, however, responded to salines, and he had twenty-seven movements in twenty-four hours. The purgation was kept up, the distension passed away, and he recovered without further accident.

It is next to impossible to review the combined statistics without concluding on peremptory instruction. The reports of experienced and favorably situated individual surgeons are even more mandatory. These cases demand prompt exploratory surgery—the simplest and least burdening in responsibility required in the abdomen. And how widely extended is the field! If we will but think, we will remember that as often as at least once a week, the daily newspapers of every large city will chronicle an abdominal gunshot into the reach, in abundant time, of some local surgeon. This is true all over the southern and western country. Very few of these are ever seen by surgeons. Why not? Because we have not educated the physician to appreciate the folly and fatality of delay, and the hopefulness of prompt and efficient aid. True it is that while most of us are agreed in the main that operation is indicated in gunshot wounds of the abdomen, and that delayed cases give bad returns, the exact statistics are not made clear to the general practitioner.

Every man who deserves the name of physician now knows that a strangulated hernia can not get well without operation, that long taxis is dangerous, and delay little less than fatal. All such patients, in anything like intelligent hands, are hurried to the surgeon. But

it has been only a few years since text-books of surgery advised opium, elevation of the hips, hot applications, and delay for hours, even days, to see if the condition could not be relieved without surgery; then, when too late for success, division of the stricture without opening the sac, which can not half the time hope to relieve the constriction. The mortality after an operation, which if done in our time in season, under proper surroundings, is less than 1 per cent., is put down by Gross, in 1850, at nearly 50 per cent.

Not less clear are the indications for operation in a traced gunshot wound of the abdomen. But there time is far more precious than in hernia, and the need of positive and uniform instruction is imperative. There is some excuse for our wavering and inconsistent views on appendicitis; its mild prognosis when treated by expectancy; its masked pathology; and the history of frequent recovery after desperate symptoms, naturally admit of difference in surgical judgment; but in the lesion under consideration there is no double ground. Exploration is the only means of accurate diagnosis, and death is practically certain in untreated penetrating wounds after twenty-four hours' delay. How much this means to the prolongation of life can not be determined until these conclusions become surgical principles, and are inculcated into the mind of every practising physician in our western and southern country.

As to the duty of the surgeon, I add here as I declared in the paper read before this Association at Memphis: "With these facts before us, it is clear that to delay in a delusive hope until peritonitis shows its folly, is almost a crime. The practical management of a suspected penetrating wound is as plain duty as the tying of a bleeding artery. As soon as possible after injury the patient is to be transported to a suitable place and under usual precautions; after all preparations are made for laparotomy and repair of lesions, an experienced hand should carefully trace the course of the ball into the cavity, if it goes there. This is easy enough when the penetration is direct from the abdominal wall, but often difficult or impossible when from behind or from the thoracic or pelvic cavities. Under these latter circumstances the history of the direction of the projectile, and the general symptoms must be the only guide, giving to the side of operation the benefit of the doubt."

PROFESSIONAL EDUCATION AND ETHICS.*

BY A. E. BALDWIN, M.D., LL.B., D.D.S.

CHICAGO.

In presenting this subject I am not unmindful of the fact that it is large, and one that affects the interests of not only the profession—or our branch of it—especially, but even more the interests of all those who are put under our charge. The importance of it has grown on me each year for many years, and I have always been attracted to anything that I have found in print pertaining to it, but to my mind the most vital point is seldom touched on, and now, when our schools are almost universally demanding a course of four years, as well as considerable attention to a preliminary education, the time is ripe to call attention to an absence in this teaching of some things that are of vital importance to the practitioner and to those who patronize him.

May I be allowed to enter a plea for the merging of the two subjects of the paper into one, for the education

is not and can not be complete without great attention being given to the part of the education called "ethics," the meaning of which is: "The science of right conduct and character; a system of principles and rules concerning moral obligations and regards for the rights of others?" Why should not this be regarded as important as any part of the so-called "education." Without it our young graduates will not be able to enter on their duties as professional men with a proper education, for we should consider that our duty to our patrons consists in more than an effort to place their money in our pockets in as great quantities and for as little service as possible. How can we expect this matter to be regarded as in the least vital to our graduates, when the teaching pertaining to these duties is so different? To be sure, they are hard to specifically define in individual cases, but in them all there are certain well-defined principles of equity and justice which are apparently absent from the training of the mind and the hands of students in these years of student life. Might I not go a step further and say that there are many things taught in our colleges, by both precept and example, that exert a very baneful influence on the moral element of the student, and it is a fact well known to us all that should a teacher attempt to teach one thing and then do the opposite, the good of the attempted teaching is not only *nil*, but a lesson is drawn by the pupil that is not, to state it mildly, in the line of ethics proper?

In this matter of education I should speak of the lack of encouragement—at least in most of our schools—of original work in microscopic and bacteriologic investigation, and help to settle the matter as to the exact place occupied by the much-talked-of microbes and bacteria. There are many things in regard to oral troubles that are as yet uncertain, and these students may, if encouraged and helped while attending college, give us much light as to causes and results; they may be able to show us that in many instances these organisms are present to assist Nature in alleviation, or may clearly show us facts, new to us, of their ravages. I am constrained to say that there is reason to fear that we have oftentimes arrived at conclusions that are unwarranted with the light of to-day; or, in other words, many of our conclusions are reached without a sufficient grounding in facts. Illustrating this I call to mind a teacher in one of our schools, who has brought before the profession scores and probably hundreds of remedies, each one "more wonderful" than the preceding one, and many of them would never be recommended or used if a little more time was taken by him and others in proving their worth before shouting their almost specific virtues.

I do not want to do any injustice to teachers, or schools; my effort is to simply call attention to a few of these shortcomings with the hope that it may result in bringing others to recognize these truths, and that in time a change may be brought about in the character of the instruction given in colleges, offices, and societies.

Why do we not demand that the standard of our department of the profession be raised? Is not the reason this: we do not practice true ethics ourselves and with our patrons? Are we all, and at all times, careful to advise our patients just what we should want to be advised were we in their place; are we certain that we have not at times advised and performed operations that we knew at the time would have been better done some other way?

Some years ago I visited a neighboring dentist, and while there he prepared the cavity and filled a tooth for a patient, and when about ready to introduce the filling he asked me to examine the cavity. I did so and at the

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