Diagnostic peritoneal lavage analysis: should trauma guidelines be revised?

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Objectives: Diagnostic peritoneal lavage (DPL) is used to detect intraperitoneal bleeding in patients sustaining blunt and penetrating abdominal trauma. The procedure should be performed by an experienced general surgeon, and the fluid obtained analysed by haematology technicians. Current Advanced Trauma Life Support guidelines are very clear on what constitutes a positive result, mandating laparotomy. The aim of this work was to assess whether DPL could actually be performed in practice.

Methods: A telephone survey was performed of a random selection of haematology technicians in 40 major trauma units in the UK, to assess whether they could actually analyse a DPL sample if it were sent to them. This was performed both during the day, and "out of hours". Secondly the experience of performing DPL was determined among 1797 general surgical trainees and consultants, by means of a questionnaire.

Results: Between 9 am and 5 pm 29 of 40 haematology technicians questioned were able to analyse a sample of DPL fluid. This compared with a figure of 9 of 40 when the questionnaire was administered "out of hours". A total of 854 (48%) questionnaires were received from surgical trainees and consultants. Approximately 60% of those questioned had performed less than 10 DPLs throughout the whole of their careers.

Discussion: These results suggest that UK surgeons have little experience in performing DPL, and even if they do it is unlikely that any haematology departments will be able to analyse the sample, especially if performed after 5 pm. ATLS guidelines should be changed, and this investigation abandoned in favour of abdominal ultrasound.

Diagnostic peritoneal lavage (DPL) in patients sustaining blunt abdominal trauma is rapidly performed and over 90% sensitive and specific for the presence of intraperitoneal bleeding.¹ Current guidelines as taught in Advanced Trauma Life Support (ATLS) courses throughout the world, suggest that "a positive test and the need for surgical intervention are indicated by $>100\,000$ red cells/mm³, >500 white cells/mm³, or a Gram's stain with bacteria present" in the fluid obtained.² The aim of this study was to assess if samples obtained after a DPL could actually be analysed by haematology technicians, and to detail current experience with the procedure among UK general surgeons.

METHODS

Two hundred and eighty six hospitals designated as "major units" were identified from the 1998/99 United Kingdom Directory of Accident and Emergency Departments. Every fifth hospital was selected up to the fortieth. A standard questionnaire was used and a telephone interview conducted between the haematology technician covering emergencies, and thus responsible for analysing fluid obtained from a DPL, and two clinicians (MF and JH). This was performed both during the day (9 am to 5 pm) and out of hours (5 pm to 9 am). Questions asked included: Whether a DPL sample could be analysed or not, and if not why not; whether a specific tube or fluid was required; amount of sample required; length of time that technician needed to perform the analysis; number performed in previous 12 months; whether there were departmental guidelines, and the number of years in post of the haematology technician questioned.

To assess current levels of experience with DPL a questionnaire was sent to 1797 general surgical consultants and higher surgical trainees (HSTs). This sample group was obtained

from the mailing lists of the Association of Surgeons of Great Britain and Ireland and the Association of Surgeons in Training. The study was performed under the auspices of the faculty of the Definitive Surgical Skills Course of the Royal College of Surgeons of England.

RESULTS

During working hours (9 am to 5 pm), 29 of 40 haematology technicians contacted were able to process a sample of fluid after a DPL. The mean length of time taken was 14.8 minutes, although 11 haematologists took over 15 minutes, and in two cases up to one hour. Fourteen stipulated that the fluid obtained needed to be in an EDTA bottle, while the remainder had no preference. The actual fluid used to perform the DPL by the surgeon would have no bearing on results in 19 cases, though five stated that it must be isotonic, and two that it must be saline. The amount of fluid required varied between 100 µl and 5 ml (mean 0.96 ml). Only five departments actually had any guidelines for this investigation. Twenty had not analysed a DPL sample within the past 12 months, six had analysed between one and five, two 6–10, and one department claimed to have processed over 100. The mean duration of the haematology technician in post was 23.1 years (range 10–40 years).

Reasons given for why the DPL fluid could not be analysed included: fluid "blocking the machine" (2), "never heard of the investigation" (1), lack of guidelines (2), and one felt the department had tried it, but could not get it to work. The remainder could give no reason.

The same 40 hospitals were contacted on the same day out of hours. In contrast only nine hospitals were able to analyse any DPL sample received. Twenty one said they definitely could not. Five technicians were not sure, while five were uncontactable through the hospital switchboard.

Table 1 Number of times DPL performed throughout career to date

	Total (all grades)	Consultant				HST	Grade unspecified
		>10 years	5–9 years	2–4 years	<2 years		
0	122	51	14	5	3	45	4
1–10	383	122	52	27	26	152	4
11–20	133	48	35	12	14	23	1
>20	193	102	42	15	11	22	1
Don't know	23	10	0	2	0	3	8
Total	854	333	143	61	54	245	18

Altogether 854 (48%) responses were received from consultant surgeons and higher surgical trainees to a questionnaire detailing current levels of experience with DPL. About 60% of all surgeons questioned had performed less than 10 DPLs in the whole of their careers (table 1). More worryingly there was very little increase in experience with duration in post, with as many as 52% of consultant surgeons in post for over 10 years performing a similar number.

DISCUSSION

This work suggests that junior consultants and HSTs have limited experience of performing DPL. In addition if they do perform the procedure out of hours, there is a 75% chance that the haematology technician they contact will be unable to analyse the sample they send.

The telephone questionnaire of haematology technicians also revealed a number of other points. The length of time required to analyse a sample is up to one hour in some hospitals—not ideal if the patient is haemodynamically unstable. Of greater concern is that these poor results come from so called “major units”, where you would expect a certain expertise in the care of multiply injured patients, and haematology departments to at least have guidelines for this investigation. There are also significant variations between departments in terms of the fluid used for the DPL, the amount required, and the container it is put in. None of these issues are dealt with in the current ATLS system. If we are going to persist with use of this investigation, then haematology departments at very least need further education and guidelines.

Consultants and HSTs were specifically questioned as they are the grade of surgeon who should be performing any DPL. It is probable that all HSTs and consultants in post for less than 10 years will be familiar with the ATLS system, though clearly these results suggest that current experience with this investigation is lacking. This may be because most work in units where ultrasound scanning is performed in the accident and emergency department, and there is no need for DPL. This seems unlikely. It may be that DPL is left to senior house officers, or worse, computed tomography is performed inappropriately on haemodynamically unstable patients. It may also be

that A&E doctors are performing DPL rather than general surgeons, or that trauma patients just go straight to the operating theatre, and a lot of negative laparotomies are performed. The conclusion from this work is that the surgeons who should be performing this investigation are not.

While there have been numerous papers testament to the efficacy of DPL, this is the first that actually asks whether it can be performed in practice. Clearly there are serious shortcomings. Abdominal ultrasound has been shown to be comparable to DPL,³ and in the light of these results, would seem to be a more appropriate modality for the assessment of trauma patients, as others have suggested.^{4,5} This work shows that DPL is not workable in the current climate, and that ATLS teaching needs revising. In addition it would seem sensible to devote greater resources to the provision of ultrasound in A&E departments, and improve training in its use.

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