

# The use of fluoroscan in fracture clinics during the COVID pandemic to optimise conservative treatment

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During the COVID pandemic, guidelines were put into place by The British Orthopaedic Association (BOA) to limit patient contact, and this resulted in a preference for non-surgical management when feasible.<sup>1</sup> We introduced a fluoroscopy scanner into the fracture clinic at Queens Burton Hospital to optimise the non-operative management of traumatic injuries whilst obeying these guidelines of reducing patient contact. Occasionally, fractures seen in fracture clinics require manipulation before making the decision on whether the injury can be managed surgically or non-surgically. The fluoroscan was a mobile radiograph that can be operated locally to provide immediate radiographic feedback of the injury.<sup>2</sup> In addition to reducing person-person contact and time in hospital, this also enabled any attempts of manipulation to be performed with immediate visual feedback on fracture position, enabling any further manipulation attempts to be performed when indicated.

The fluoroscopy scanner was placed in a safe location in the fracture clinic, identified by one of the radiation protection officers (RPO), removing risks of radiation to other staff and patients attending the fracture clinic. Appropriate training and safety checks were undertaken by clinical staff under the supervision of the RPO.<sup>3</sup> When a patient required a manipulation, it was performed by two trained professionals with a separate surgeon or trained nurse monitoring the patient. Three main methods of analgesia (haematoma block, pentrox, entonox or a combination) were utilised to facilitate the manipulation.

An intervention was performed on 100 patients (69 females) who attended the fracture clinic during the study period and required manipulation, with an average age of 53 years. There were 85 upper limb cases, 68 of which affected the patients' dominant hand, and 15 lower limb cases; 58 were on the left. The majority of the upper limb cases were distal radius ( $n=53$ ) (Table 1). Two-thirds (69) of manipulations were performed by consultants and the remaining one-third were performed by senior trainees. The Dose Area Product (DAP) averaged 1.3 Gy $\text{cm}^2$  with all cases being below the safe lower limit (less than three) according to the radiation protection protocol implemented within the hospital (Table 2).

A satisfactory reduction was achieved and maintained using a fluoroscan in the fracture clinic for 71 patients. The maintenance of fracture reduction was measured by repeat follow-up imaging at 6 weeks. The affected limb was held with a standard plaster cast for all patients. The reduction was not maintained in 29 patients, seven of which required a re-manipulation, five were deemed not medically stable from an anaesthetic point of view, and two patients preferred not to have surgery. Surgery was performed on 22 patients where the reduction was not maintained. On average, these patients showed evidence that the reduction was not maintained 12 days post-manipulation and day 16 post-injury (Table 1).

In conclusion, the COVID pandemic created an unprecedented situation that necessitated a change in practice due to a reduction in space, personal and theatre availability. Introducing fluoroscan into the fracture clinic was both effective and efficient. It facilitated the orthopaedic surgeons being able to treat more patients in a timely safe fashion within the trust and this has become adopted as a permanent service improvement within the department freeing up expensive theatre time to address the backlog in elective surgery.

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Trauma

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DOI: 10.1177/14604086221132338

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**Table 1.** Details of the 100 fractures manipulated with fluoroscan.

Fracture type		Satisfactory	Unsatisfactory	Accepted*	Total
Upper limb	Elbow	2	0	0	2
	Distal radius	39	11	3	53
	Carpal/CMC	0	3	03	
	Metacarpal	14	3	2	19
	Phalanges	6	2	0	8
Lower limb	Ankle	5	3	2	10
	Phalanges	5	0	0	5

\*The Accepted category is unsatisfactory reductions not operated on due to either being unfit for surgery or patient refusal; all underwent a further fluoroscan manipulation first.

**Table 2.** Fracture manipulation details.

Fracture manipulation details		n (out of 100)
Time interval between fracture and manipulation	Less than 24 h	36
	1–7 days	46
	8–14 days	13
	More than 14 days	5
Type of anaesthesia used	Haematoma block	19
	Penthrox	26
	Entonox	41
	Combined block + Penthrox	12
	None	2
Radiology exposure (DAP)/Gycm <sup>2</sup>	Less than 1	74
	From 1 to 2	21
	From 2 to 3	5
	More than 3	0
Physiotherapy outcome for 78 non-operated cases	Satisfactory	74
	Unsatisfactory	4

### Contributorship

Setting the research plan; CK and NA. The fluoroscan operating surgeons; NA, CK, MN. Statistical analysis and writing the results and abstract; MN. Writing the Letter; JH. Letter final revision; NA.

### Ethical approval

The research has been approved by the clinical committee of the Trauma and Orthopaedics department and by the Ethical and Audit committee at the Queens Burton Hospital.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### Guarantor

MN.

### Informed consent

Written informed consent was obtained from all subjects before the study.

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