Surgeon, test (and heal) thyself: sharps injuries and hepatitis C risk

Katrina J R Watson

ABSTRACT

- Sharps injuries experienced by surgeons are common, but are under-recognised and under-reported.
- The overall risks of transmission of blood-borne viruses to surgeons are low, with hepatitis C posing the greatest transmission risk. Recent trials show that early treatment of acute hepatitis C results in a cure rate approaching 100%.
- Surgeons and theatre staff should be encouraged to report and follow up sharps injuries to allow early detection and treatment. Additionally, because exposures to blood-borne viruses may be unrecognised, surgeons should have regular tests for blood-borne viruses.
- There should be no restriction of practice in the "window period" between potential exposure and obtaining results of testing, because of the overall low risk of transmission.

MJA 2004; 181: 366–367

Surgeons and others who perform exposure-prone procedures are at risk of contracting blood-borne viruses, but do not always recognise or report potential exposures. They may be reluctant to report sharps injuries, or to present for testing for blood-borne virus transmission, for fear of being barred from surgical practice. Although surgeons may fear transmission of HIV in particular, it is hepatitis C that poses the greatest risk.[1,2] Estimates of this risk have sometimes included an alarmingly high predicted cumulative incidence of hepatitis C.[3] However, cross-sectional studies show the actual seroprevalences of hepatitis C in surgeons to be equivalent to, or slightly higher than, those of the general population.[4,5] Therefore, the risk seems to be considerably lower than might be predicted, and can be estimated by the formula in Box 1.

From this formula, a surgeon who performs 300 procedures per year and is at the end of a 35-year surgical career has a risk of 4.9% of being HCV antibody-positive, with a 3.8% risk of being RNA-positive on polymerase chain reaction testing (people are not infectious and will not develop any disease unless they are HCV RNA-positive). The lower and upper bounds of being RNA-positive using the highest published estimates of Pr(si) and Pr(trans) are 3.2% and 26.3%. The estimated prevalence of RNA positivity (using the most commonly accepted average probabilities) after 15 years of surgical practice (ie, mid-career) is 1.6% (equivalent to the general population).

Risks to patients from HCV-positive surgeons

Surgeons who are HCV-positive pose a low, but definite potential, risk to patients. As acute hepatitis C is usually asymptomatic, infection will often be unrecognised. Although several published cases have documented surgeon-to-patient transmission,[11-13] the investigations that have followed such cases have generally shown no or minimal exposure in other patients of these surgeons — transmission rates of 0.036%–2.2%.[12,13] An estimate of risk to an individual patient from a surgeon known to be HCV antibody-positive and RNA-positive is shown in Box 2.

The overall probability of transmission in such a situation is 0.0001 (or 1 per 10 000 procedures). This is somewhat lower than some published estimates, which have used higher probabilities for some variables.[7,14]

Risks to patients during the "window period" of infection

If a surgeon sustains a known sharps injury from an RNA-positive patient, protocols for testing vary. A recommended protocol is RNA testing at 4 weeks, followed by anti-HCV testing at 8 and 12 weeks.[2] Tests for RNA usually become positive between 10 days and 6 weeks after infection. The risk that a surgeon might transmit hepatitis C during this window period is derived by multiplying the formula in Box 2 by the transmission risk to surgeon (1.8%), so that the overall risk to an individual patient is 0.000002, or 2 per million procedures.

Treatment for people who acquire hepatitis C through surgery

The major advantage of early testing is access for the surgeon to probable cure. Jaeckel et al showed that, of 44 German patients treated with high-dose interferon monotherapy, 99.5% achieved a cure.[16] There was no control group, and historical data were used. These patients differed from the situation in exposed surgeons, as almost all patients were symptomatic. However, the distribution of genotypes was similar to that in Australia. Most patients (61%) had genotype 1 (the more "difficult to treat" genotype). The patients received 5 million units of interferon alfa-2b subcutaneously daily for 4 weeks, followed by 5 million units three times a week for another 20 weeks. Despite these relatively high doses, there were no serious adverse effects. Only one patient withdrew (at 12 weeks, because of hair loss and flu-like symptoms).

A recent German–Egyptian study indicates that pegylated interferon combined with ribavirin can achieve results similar to those with high-dose interferon.[17] This treatment has fewer adverse effects than non-pegylated interferon. Sustained virological response was a little lower than in the Jaeckel study (85% for combination pegylated interferon–ribavirin, and 80% for pegylated interferon monotherapy).[16] This may be because treatment was not commenced until 16 weeks after HCV infection, compared with a mean of 89 days in the Jaeckel study. Some

Department of Gastroenterology, St Vincent's Hospital, Fitzroy, VIC.
Katrina J R Watson, MB BS, FRACP, MPH, Gastroenterologist.
Reprints will not be available from the authors. Correspondence: Dr K J R Watson, Department of Gastroenterology, St Vincent's Hospital, Victoria Parade, Fitzroy, VIC 3065. watsonkj@svhm.org.au

1 Estimate of risk of surgeon being hepatitis C antibody positive

Cumulative incidence of anti-HCV positivity =

Pr(pop) Pr(RNA pos) Pr(si) Pr(trans) No. cases per year No. years in practice

Where:

Pr(pop) = population prevalence of anti-HCV antibody: about 1.5% in Australia[6]

Pr(RNA pos) = probability of being positive for hepatitis C viral RNA: about 75%[7] (only RNA-positive patients are at risk of disease, or pose a transmission risk to others)

Pr(si) = probability of sharps injury occurring: highly variable, published rates vary from 2% to 10%.[7-10] A reasonable working estimate is 2.3%.[7,8]

Pr(trans) = probability of transmission occurring per exposure: ranges from 1.8% to 3%;[2,5] 1.8% has been assumed for these calculations.[2,7]

2 Estimate of risk to a patient from a surgeon known to be hepatitis C antibody positive

Probability of transmission to patient =

Pr(surgeon RNA pos) Pr(si) Pr(recontact) Pr(trans)

Where:

Pr(recontact) is the probability that blood will recontact the patient after the exposure, estimated at 30%.[15]

people advocate a similar strategy (ie, waiting for 3, or even 4, months) in all acutely infected individuals, as up to 30% of people clear the virus spontaneously. However, this extra time may affect treatment outcome adversely. Moreover, in the case of surgeons, this would necessitate an additional 2–3 months during which the surgeon would be known to be RNA-positive (at 4 weeks after exposure), but would be unable to operate.

Regular scheduled testing in surgeons

Testing after known sharps injuries will not detect all exposure in surgeons, because some injuries are not recognised, and hepatitis C is usually asymptomatic. Thus, regular testing for surgeons may be prudent to offer them relatively early treatment, and a better prospect of cure.

Treatment for chronic hepatitis C has a 50% (range, 40%–85%) cure rate,[18] but earlier detection of hepatitis C (ie, within 12 months of infection) allows a greater chance of cure, somewhere between 50% (cure rate for chronic infection) and 99% (cure rate for early acute infection).[16]

Conclusion

In summary, it is time to ensure that surgeons are aware of the compelling reasons to be tested for HCV, both after exposure and on a regular basis. The evidence shows that surgeons should not be barred from operating while waiting for an HCV RNA result after known exposure to patients positive for HCV RNA, as the risk of transmission is extremely low. However, surgeons who are known to be HCV RNA-positive should not perform exposure-prone procedures (procedures where the hands are in a body cavity with sharp instruments but limited visibility) until after successful treatment (ie, RNA-PCR testing negative repeatedly 6 months after treatment). Surgeons should be reassured that early detection of HCV is associated with an extremely high chance of a cure with prompt treatment.

Competing interests

The author has attended, organised and spoken at scientific meetings sponsored in whole or part by various companies that produce diagnostic tests or antiviral treatments for hepatitis C. The author has also been an investigator in clinical trials of antiviral agents sponsored by pharmaceutical companies.

References

1 Whitby RM, McLaws M-L. Hollow-bore needlestick injuries in a tertiary teaching hospital: epidemiology, education and engineering. *Med J Aust* 2002; 177: 418-422.

2 Charles GPC, Angus PW, Amadeus J, Grayson ML. Management of healthcare workers after occupational exposure to hepatitis C virus. *Med J Aust* 2003; 179: 153-157.

3 Pietrabissa A, Meriliano S, Montorsi M, et al. Reducing the occupational risk of infections for the surgeon: multicentric national survey on more than 15,000 surgical procedures. *World J Surg* 1997; 21: 573-578.

4 Thorburn D, Dundas D, McCruden EA, et al. A study of hepatitis C prevalence in healthcare workers in the West of Scotland. *Gut* 2001; 48: 116-120.

5 Panlilio AL, Shapiro CN, Schable CA, et al. Serosurvey of human immunodeficiency virus, hepatitis B virus and hepatitis C virus among hospital-based surgeons. *J Am Coll Surg* 1995; 180: 16-24.

6 Batey RG. Hepatitis C: where are we at and where are we going? *Med J Aust* 2002; 176: 361-362.

7 Ross RS, Viazov S, Roggendorf M. Risk of hepatitis C transmission from infected medical staff to patients: model-based calculations for surgical settings. *Arch Intern Med* 2000; 160: 2313-2316.

8 Tokars JI, Bell DM, Culver DH, et al. Percutaneous exposures during surgical procedures. *JAMA* 1992; 267: 2899-2904.

9 Short LJ, Bell DM. Risk of occupational infection with blood-borne pathogens in operating and delivery room settings. *Am J Infect Control* 1993; 21: 343-350.

10 Geberding JL, Littell C, Tarkington A, et al. Risk of exposure of surgical personnel to patients' blood during surgery at San Francisco General Hospital. *N Engl J Med* 1990; 32: 1788-1793.

11 Esteban JI, Gomez J, Marrell M, et al. Transmission of hepatitis C virus by a cardiac surgeon. *N Engl J Med* 1996; 334: 555-560.

12 Duckworth GJ, Heptonstall J, Aitken C. Transmission of hepatitis C virus from a surgeon to a patient. *Commun Dis Public Health* 1999; 2: 188-192.

13 Ross RS, Viazov S, Thormahlen M, et al. Risk of hepatitis C virus transmission from an infected gynaecologist to patients: results of a 7-year retrospective investigation. *Arch Intern Med* 2002; 162: 805-810.

14 Caillot J-L, Voigloi F, Gilly F, Fabry J. The occupational risk run by French surgeons: a disturbing perspective. *AIDS* 2000; 14: 2061-2063.

15 Heptonstall J. Surgeons who test positive for hepatitis C should be transferred to low risk duties. *Rev Med Virol* 2000; 10: 75-78.

16 Jaeckel E, Cornberg M, Wedemeyer H. et al. Treatment for acute hepatitis C with interferon alfa-2b. *N Engl J Med* 2001; 345: 1452-1457.

17 Kamal SM, Ismail A, Graham CS, et al. Pegylated interferon alpha therapy in acute hepatitis C: relation to hepatitis C Virus-specific T cell response kinetics. *Hepatology* 2004; 39: 1721-1731.

18 Teoh NC, Farrell GC. Management of chronic hepatitis C virus infection in a new era of disease control. *Intern Med J* 2004; 34: 324-337.

(Received 15 Jun 2004, accepted 17 Aug 2004) ❑