

C. EDWARD SYLVESTER (*Defendant*) .. APPELLANT;

AND

JOHN CRITS, an infant, by his next friend Neil Crits, AND NEIL CRITS (*Plaintiffs*) } RESPONDENTS;

1956
*Oct. 9, 10
*Oct. 24

AND

LIONEL A. MACKLIN, THE STRATFORD GENERAL HOSPITAL TRUST AND THE STRATFORD GENERAL HOSPITAL CORPORATION (*Defendants*).

ON APPEAL FROM THE COURT OF APPEAL FOR ONTARIO

Physicians and surgeons—Negligence—Anaesthetist—Sufficiency of precautions taken to prevent explosion—Use of combination of ether and oxygen—Danger from static electricity.

An anaesthetic was administered by introducing oxygen from a tank into a can containing ether, and then forcing the mixture of ether and oxygen through a tube (known as a Magill tube) into the patient's throat. Almost immediately after the start of the anaesthetizing process the patient developed a cyanotic condition, necessitating the administration of pure oxygen. The tubes were thereupon withdrawn from the can and oxygen was drawn from the tank into a bag, from which it was introduced through the Magill tube into the patient's lungs. As soon as the bag was filled the tube from the tank was again inserted in the ether-can, but with the pressure reduced. When the patient's condition had returned to normal the Magill tube was disconnected from the oxygen-bag, with a view to restoring the flow of the anaesthetic. At that moment a violent explosion took place, causing serious injuries to the patient. It was established in evidence

1956
 SYLVESTER
 v.
 CRITS *et al.*

that the explosion had been caused by a spark of static electricity setting aflame the ether-oxygen mixture that had escaped from the can while the Magill tube was disconnected, and accumulated near the patient's head.

Held: The anaesthetist was liable in damages for the patient's injuries. It amounted to negligence in the circumstances to leave the oxygen flowing into the ether-can while the Magill tube was not connected to it. It was not sufficient merely to reduce the pressure; the oxygen should have been turned off at the tank, which would have entailed no material delay and would have substantially reduced the danger. It was conceded that the ether-oxygen vapour was highly explosive, and that in surgical operations there was constant danger of a spark from static electricity. Admittedly there was no absolute security against either spark or explosion, but the duty of all working in such conditions was to reduce that possibility to the practicable minimum. There was no evidence that what was done in this case was approved as standard practice in hospitals.

A second alleged ground of negligence was the failure to remove the ether-can from the operating-table, close to the patient's head. But the anaesthetist's conduct in this respect had been approved by other medical witnesses, and it would be dangerous for a Court to attempt in such a matter to proscribe a step approved by the general experience of technicians and not shown to be clearly unnecessary or unduly hazardous.

APPEAL from a judgment of the Court of Appeal for Ontario (1), in so far as it reversed the judgment of Smily J. at trial (2).

G. F. Henderson, Q.C., and R. F. Merriam, for the defendant Sylvester, appellant.

J. D. Arnup, Q.C., for the plaintiffs, respondents.

The judgment of the Court was delivered by

RAND J.:—This is an appeal by an anaesthetist from a judgment (1) holding him responsible for an explosion of ether-oxygen gas in the preparatory stages of a tonsillectomy in an action brought as well against the surgeon and the hospital. Smily J., at trial, dismissed the action (2), and this was affirmed by the Court of Appeal (1) except as to the anaesthetist.

The items of negligence relied on are reduced to two: the first, that a small can containing a quantity of ether into which oxygen was introduced and from which the mixed gas was conveyed to the patient had been kept on the operating-table at a distance of between 6 and 7 inches

(1) [1956] O.R. 132, 1 D.L.R. (2) [1955] O.R. 332, [1955] 3 D.L.R. 181.

(2d) 502.

from the face of the patient; and the second, that during a suspension of anaesthetizing and while pure oxygen was being administered to counteract cyanosis, the flow of oxygen into the can and thence into the air was allowed to continue, producing a condition for the explosion which followed.

With the first ground I find it unnecessary to deal. Schroeder J.A., who gave the judgment in appeal, held it to have been practicable to keep the can in some other place than on the operating-table. During the trial the suggested place was the floor, but I would accept the opinion of Dr. Gordon that that is no place for any part of the apparatus in such a procedure. Dr. Nichols agreed that at times he had removed the can from the table, but where or under what circumstances was neither asked nor stated. The practice followed here was approved by Dr. Gordon, and it would be extremely dangerous for a Court to attempt in such a matter to proscribe a step for technicians where their general experience approves it and it is not clearly unnecessary and unduly hazardous.

The second ground, however, does not appear to be open to that stricture. It is conceded that in surgical operations there is a constant danger of a spark from static electricity and that the general means of avoiding it are known by all concerned. In particular there is a common understanding of "grounding" a charge, and of the scientific theory of differences in potential from which sparks may result. Among the means taken in the hospital to drain off or neutralize any electric condition were, a metal grid imbedded in the floor and gathered into a grounding, the wearing of cotton outer garments and leather-soled footwear, a regulated humidity, temperature and ventilation, and a prescribed mode of separating parts of the apparatus against the effects of different potentials. It is conceded also that the ether-oxygen vapour is a highly explosive mixture.

An absolute prevention of any diffusion of ether gas or of the ether-oxygen mixture is not practically possible. In the can here, besides an aperture for the admission of the oxygen tube, there was a somewhat smaller one, about $\frac{1}{4}$ -inch in diameter, through which the vapour from ether

1956
 SYLVESTER
 v.
 CRITS *et al.*
 Rand J.

1956
SYLVESTER
v.
CRITS *et al.*

as well as the mixture could escape into the air, designed to prevent a pressure being built up beyond the capacity of the patient to accept.

Rand J.

In this case, the patient, a young boy about 5 years of age, had been given pentothal to induce the first stage of anaesthesia. That was at once followed by the introduction of a small tube into the trachea, called a Magill tube, to which was connected another leading from the can. Into the can the oxygen was led from an oxygen-tank about 5 feet from the operating-table. The oxygen enters the can at a much reduced pressure from that in the tank. The tube may reach below the surface of the ether or above it, but in either case the flow causes the ether to bubble and the mixed vapour to rise and through a central orifice in the top of the can to pass into a connector and tubes leading into the trachea.

Within half a minute or so of the setting up of the apparatus connecting the oxygen-tank, the can and the patient, for some part of which the ether-oxygen gas was in flow, Dr. Sylvester noticed a bluish tinge about the lips of the patient and satisfied himself that a cyanotic condition was present which had to be corrected immediately. The connector on the tube-system from the can was disconnected from the tracheal tube, the oxygen-tube was withdrawn from the can, and both connector and oxygen-tube were introduced into a rubber bag for the purpose of filling it with pure oxygen. The pressure from the tank was stepped up and the bag was filled in the course of 10 or 15 seconds. The oxygen-tube was thereupon removed from the bag; reinserted into the can and the pressure from the tank reduced—or intended to be reduced—to normal. The oxygen-bag was then connected with the tracheal tube by means of the connector and by manual compression the oxygen was introduced into the child's lungs. In half a minute or so he was restored and respiration had become normal.

The next step was to disconnect the oxygen-bag from the tracheal tube and restore without delay the flow of the anaesthetic from the can into the lungs. To make that disconnection, Dr. Sylvester took hold firmly of the end of the tracheal tube with thumb and finger of the right hand and the metal face-piece of the bag and the connector with

the left hand and in a sort of sweeping or bending motion he brought about the separation. At that instant, with a sizzling sound, a flash of blue flame and a violent explosion followed, and the flame appeared to the doctor to be between the can and the patient's face. The effect reached to the surgeon who was standing at the foot of the operating-table and serious injuries were caused to the child.

No other cause is suggested than that of a spark of static electricity setting aflame the ether-oxygen mixture accumulated in the space between the can and the patient's head. As mentioned, from the breaking of the pipe-connection between the can and the tracheal tube until the oxygen-tube was removed from the can and connected with the oxygen-bag, and, following the "bagging" of the child, from the time of restoring the oxygen-tube to the can until the breaking of the connection between the oxygen-bag and the tracheal tube, the oxygen was flowing into the can mixing with the ether and escaping through both the small release aperture and the main opening from which led the tube to the patient. In addition to that, there was the flow of oxygen to the can before action was taken to restore respiration, and that the gas did not, in any quantity, then reach the lungs is indicated by the cyanotic development. The time, therefore, of the flow which escaped and was escaping when the final disconnection was made cannot have been less than 2 to 3 minutes. It does not require a technician's understanding to see that a dangerous volume of the gaseous mixture had built up in the immediate area in which the flash of flame appeared.

The evidence is not at all clear whether, when the bag was filled and the oxygen-tube restored to the tank, the pressure in the tank had been reduced by Dr. Sylvester or by a nurse. In one place his language would indicate that he had done it but in another he could not be certain that it was not by a nurse. It was suggested to him that, at that point, to have turned the oxygen-tank off completely would have entailed no material delay and would have reduced substantially the danger. This he first met with two objections, that he wanted the gas to be ready immediately upon resuscitation, and that it was just another manipulation which he thought unnecessary. Later, he spoke of the

1956
SYLVESTER
v.
CRITS *et al.*
Rand J.

1956
 SYLVESTER
 v.
 CRITS *et al.*
 Rand J.

latter as the real objection. It was obviously as easy, if not easier, to turn the oxygen pressure off completely than to turn it down to the normal. He could not say whether there was a flow-gauge on the tank, and the degree of flow was estimated. If this reduction had been made by a nurse it is impossible to say what amount was made or at what speed the flow continued. Upon restoring the anaesthetizing-system, it would have been only a matter of a second or so for him to reach to the oxygen-tank and open the valve and the time for the oxygen to pass through the distance of 6 or 7 feet of tube into the can and the distance of 6 or 7 inches to the mouth of the patient would not have exceeded 5 to 10 seconds. No doubt it was desirable to renew the anaesthesia without unnecessary delay, but since the respiration was back to normal and the effects of the pentothal were far from exhausted, the additional step would have been immaterial to the procedure.

The fact seems to be that Dr. Sylvester assumed that static electricity was sufficiently guarded against. Admittedly there is no absolute security against either spark or explosion. While all operations must run a risk of such an unlikely eventuality, the duty of all working in such conditions is to reduce that possibility to the practicable minimum. Was, then, the act of allowing the ether-oxygen mixture to escape reasonably necessary? Involved in that determination is its working out in actual practice and if it could be shown that a uniform practice throughout hospitals had found it to be one of the requirements of the procedure, then the Court is not in a position to dictate to that judgment. Was it a step approved by what is called "standard practice"?

On that there is a minimum of evidence. An answer given by the doctor on cross-examination is said by Mr. Henderson to establish that fact. To understand the answer, it is necessary to read a previous question and answer:

Q. Now, I want to ask you what was your custom and practice in regard to that? That is to say, when you administer this type of anaesthetic using an ether-can did you always put it on the cotton sheet on top of the mattress? A. That was my custom and practice.

Q. Yes. Well, then, I believe you spoke of the fact that when you were administering the oxygen by means of the bag—compressing the bag—that the cotton sheet—that the oxygen was still flowing through the rubber tube into the ether can? A. That would be the practice, yes.

1956
 SYLVESTER
 v.
 CRITS *et al.*
 ———
 Rand J.

To this last language I can give only one interpretation, that “the practice” to which he refers was his practice and not standard or general practice. Neither Dr. Nichols nor Dr. Gordon was questioned specifically on this point; but that it was looked upon as one of importance appears from the cross-examination of Dr. Sylvester by counsel both for the hospital and for the plaintiff. It was, therefore, an issue clearly raised by the evidence but left in the state I have indicated.

I think the evidence justified the Court of Appeal in holding that it was an improper practice because quite unnecessary. Although to turn the oxygen on again to the normal pressure was an additional act, it was one that could fit easily and habitually into the procedure, even more so than turning the pressure down—without a gauge—to the normal. It created, undoubtedly, a serious increase in the hazard; the extra time involved was insignificant; and in the proximity to the patient of such a body of explosive gas it would seem to me, in the absence of the evidence of wide and confirmed experience, to be without justification. At any rate, I am quite unable to say that the view taken by the Court of Appeal was wrong.

The appeal must, therefore, be dismissed with costs.

Appeal dismissed with costs.

Solicitors for the plaintiffs, respondents: Gregory, Anderson, Ehgoetz & Bell, Stratford.

Solicitors for the defendant Sylvester, appellant, and the defendant Macklin: Gowling, MacTavish, Osborne & Henderson, Ottawa.

Solicitors for the defendant corporations: Mitchell & Hockin, London.
