

Case Report

Nasopharyngeal radium irradiation: The lessons of history



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ABSTRACT

In the Netherlands, nasopharyngeal radium irradiation was started in 1945. The indications included refractory symptoms of otitis media with effusion and other adenoid-related disorders after adenoidectomy. It was considered a safe and effective therapy. Its use decreased sharply in 1958, following a worldwide media avalanche around the dramatic events in the treatment of a 5-year-old child in Utrecht, enhancing the widespread fear of radioactivity. This case history illustrates the powerful role of the media in medical decision-making.

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1. Introduction

In the 1950s adenoidectomy was the first choice for the treatment of children with otitis media with effusion (at that time called 'tubal deafness'), mostly in combination with chronic rhinitis and habitual mouth breathing. The results of this procedure, however, were often disappointing. Doctor Samuel Crowe (1883–1955) initiated nasopharyngeal radium irradiation (NRI) in 1926 [1]. This therapy was given to submariners and Allied Air Force personnel during World War II to treat aero-otitis. It was reported to be highly effective in these cases [2]. In 1945 this therapy was started in the Netherlands in children with adenoid-related disorders, mainly otitis media. The results were good, even excellent, particularly on hearing [3]. Between 1945 and 1981 about 24,000 children in the Netherlands were treated with NRI [4]. Worldwide, approximately 500,000 to 2.5 million patients underwent NRI [5].

In the fifties it was rather common to treat benign disorders with radiation. Before 1958 very few authors had warned of possible adverse effects, in particular the induction of malignancies [6,7]. Nevertheless, NRI was considered a highly effective and safe way to treat children for otitis media with effusion and other adenoid-related symptoms. Patients with refractory symptoms after adenoidectomy had been treated with NRI since 1945 in the Netherlands. This paper documents the worldwide surge of

publicity after a dramatic case history in 1958 in Utrecht, the Netherlands, as well as the subsequent sharp decline of the application of this therapy. The illustrations are derived from newspapers that appeared in 1958.

2. The events in 1958, a chronological survey

2.1. Wednesday, January 15, 1958

The patient is a 5-year-old girl who was living in the village of Putten in the Netherlands (Fig. 1). She suffered from chronic rhinitis and hearing loss, resulting from otitis media with effusion. In July 1957 she had undergone adenoidectomy in a regional hospital, but the outcome was disappointing as the nasal obstruction and hearing loss did not resolve. Therefore she had been referred to the ORL department of the University Hospital Utrecht, some 50 km from her home.

Around 11 o'clock a.m. she arrived at the hospital accompanied by her father. The therapy was started in a separate room where the radium capsules were stored, each mounted on an applicator, a sort of needle, and secured in a lead container. A resident arrived and inserted the applicator in the patient's nose and set the alarm clock for 8 min 30 sec, the duration of irradiation on one side of the nose. The applicator was then removed and the procedure was repeated on the other side. When the alarm clock went off for the second time another doctor came in and removed the applicator. Afterwards the patient was sent home. Around 22 o'clock, she showed

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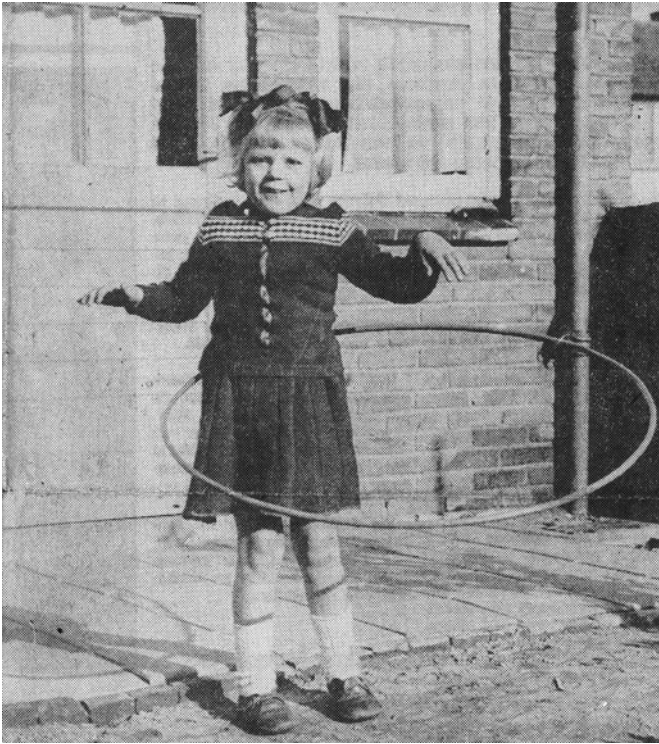


Fig. 1. The patient at the age of 5 years in 1958. [Permission of publication of this picture has been granted.]

signs of nausea and started vomiting. Her father grabbed a newspaper and collected the vomit, then shoved this paper into the coal-burning heater. In the fifties and sixties most houses in the Netherlands had a coal fire in the living room and it was not un-

usual to burn all kinds of litter in it. Afterwards the patient returned to bed and slept well.

2.2. Thursday, January 16, 1958

Another patient had to be treated with radium therapy in the University Hospital Utrecht. Upon checking the equipment, it became apparent that the radium capsule that belonged on one of the applicators was missing. A major alarm was sounded and an immediate search was started. The office was thoroughly examined with Geiger counters but nothing was found. The corridors and the other rooms of the department were inspected as well. Nothing was found. It was concluded that the capsule had been left in the body of the patient. There was no telephone at her home, so the police in Putten were called to warn the family and to convince them to bring her as soon as possible to the hospital in Utrecht (Fig. 2). When she arrived there early in the afternoon, she was examined with X-rays and a Geiger counter. No radium capsule and no radioactivity were found. The capsule could not have simply disappeared, so it was decided to inspect the patient's home with Geiger counters. In the meantime the patient and her family had to remain at the hospital (Fig. 3).

2.3. Friday January 17 - Monday, February 10, 1958

In the morning of January 17, 1958 a team of investigators arrived at the house in Putten and started their search with Geiger counters. Evidence of radiation was found in the living room, the chimney and the garden. Now it became clear that the patient's nasal secretions and vomit had reached the heater and the chimney. The garden was contaminated because the father had scattered the ashes on the snow-covered path to make the area less slippery.

The patient and her family, consisting of three sisters, one brother, her father and her mother, had to stay at the hospital (Fig. 4). A major clean-up operation was initiated. All persons in the



Fig. 2. The patient and her family arriving at the University Hospital Utrecht on Thursday, January 16, 1958.



Fig. 3. The quarantine outbuilding of the University Hospital Utrecht where the family stayed for six weeks.

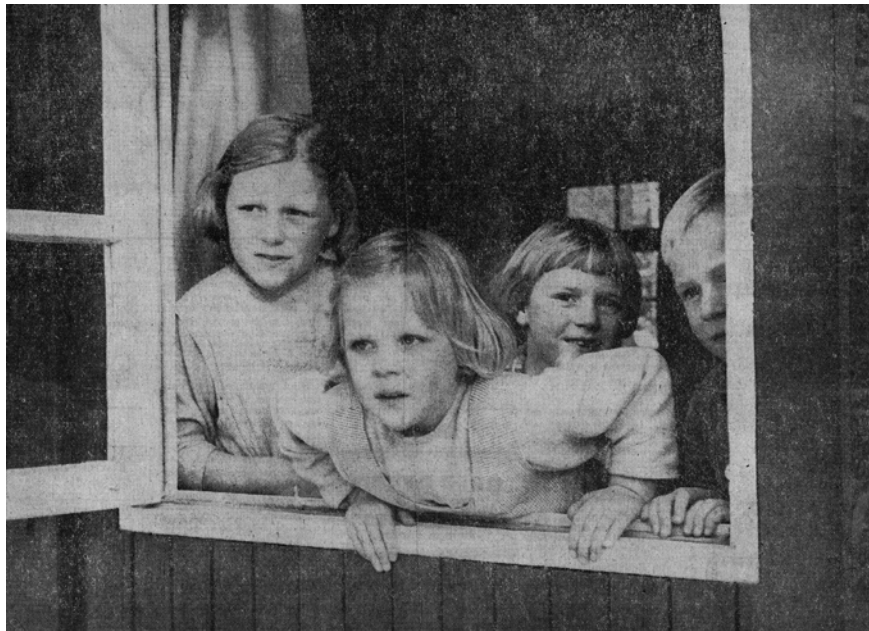


Fig. 4. The patient and her sisters and brother leaning out of the quarantine outbuilding.

neighborhood were checked for radioactive contamination (Fig. 5). The school next door was closed and the pupils were sent home, after being checked with Geiger counters (Fig. 6). A barbed-wire

fence was erected around the house with signs saying 'life-threatening danger' (Fig. 7). The site was placed under continuous police surveillance (Fig. 8). The garden was covered with a plastic



Fig. 5. Shoes are examined with a Geiger counter.



Fig. 6. A pupil of the neighboring school is examined with a Geiger counter.

tarpaulin, firmly secured with stones (Fig. 9). In the military, the best expertise to deal with radioactive contaminations was in the Marine Corps, so the Marines were called upon to carry out the cleaning job. A team of Marine personnel wearing special protective clothing entered the house (Figs. 10 and 11). Their plan was to tear down and remove all parts that were contaminated, starting with the heater and the chimney (Fig. 12). Sections of the walls and floors were torn out and broken up into small pieces. A layer of about 20 cm was dug off the surface of the ground in the garden. The removed material and the contaminated soil were sealed in 28 concrete drums, which were then packed in wooden cases (Fig. 13). These cases were loaded on two special trucks that had a concrete barrier between the cabin and the load in order to protect the driver from radiation.

2.4. Monday February 10 - Wednesday, February 26, 1958

On February 10 the radioactive debris was transported to the naval base in Den Helder and loaded aboard the cruiser *H.Ms. De Zeven Provinciën*. The media were told that the drums had been dumped in the Atlantic Ocean at a depth of about three km, far off the coast and far from fishing grounds. Years later the truth came out: the drums had been dumped in the North Sea only 40 km offshore at a depth of just 30 m. This was not the only scandal, however. As it turned out, there was a mismatch between the size

of the concrete drums and the surrounding wooden casing such that some of the drums did not sink but kept floating on the waves. Gunners were called in to shoot holes in the casing. To this day it is unknown whether this manner of disposal has caused any radioactive contamination of the sea water. The house in Putten was renovated.

2.5. Wednesday, February 26, 1958 and the aftermath

On February 26, the patient and her family could return home after a stay of six weeks in the quarantine outbuilding at the University Hospital Utrecht. She was warmly welcomed by the inhabitants of Putten and received by the mayor (Fig. 14). There was extensive press coverage of her return home. For a long time afterwards, however, she was more or less stigmatized, since some people believed that she was a source of radioactivity. Some parents did not allow their children to play with her, as they thought she might jeopardize their health.

In the beginning she frequently went to the hospital for follow-up. It is not known whether the rhinitis and otitis were cured, but she grew up in good health (Fig. 15). She married and gave birth to two healthy children; now, at 63, she is a grandmother of two (Fig. 16). Apparently the whole event has not led to any negative sequelae. The radium capsule was probably not stuck in her nasopharynx for the whole day after its insertion. It is almost certain that she had swallowed it and that most of the radiation was



Fig. 7. A barbed-wired fence around the house and a warning sign: 'life danger'.



Fig. 8. The house of the family is under continuous police surveillance.

therefore not targeted to her nose and nasopharynx but to her intestine during most of the day. Anyhow, in the course of 58 years, no radioactivity-related disorders have been demonstrated.

3. Discussion and conclusion

Reports on the dangers of NRI appeared mainly after 1958, gradually raising awareness of possible long-term side effects such as the induction of malignant tumors. In these publications an increased risk of brain tumors is suggested, but never on convincing scientific grounds [8–14]. On the other hand, some reports on follow-up examinations revealed no malignancies at all, and the authors considered nasopharyngeal irradiation to be safe [15–17].

The failed application of NRI in Utrecht in 1958 prompted widespread publicity, initially in the Netherlands, but soon extensive reports and commentary appeared in newspapers around the world. It was a time of heightened political unrest and fear of a nuclear East-West conflict. The first nuclear reactors had been put into operation, but the risks were still unclear. In 1958, words like 'radioactivity', 'fallout', 'nuclear', and 'radiation' had a threatening and alarming undertone.

The media avalanche after the events in Utrecht marked an abrupt turning point in the application of NRI. Suddenly the risks of irradiation were widely discussed, and both patients and doctors expressed their reservations about the benefits of this therapy. Immediately after February 1958, the number of institutions that performed this treatment in the Netherlands decreased sharply (Fig. 17). In the late sixties the decline was accelerated by the advent of tympanostomy tubes. Eventually, NRI was abandoned. The last time it was applied in the Netherlands was 1981.

There is no doubt that the publicity around just one instance of failure of a therapy has greatly influenced the management of a common disorder. The Utrecht incident of 1958 brought about an immediate and radical change in the management of otitis media with effusion in children.

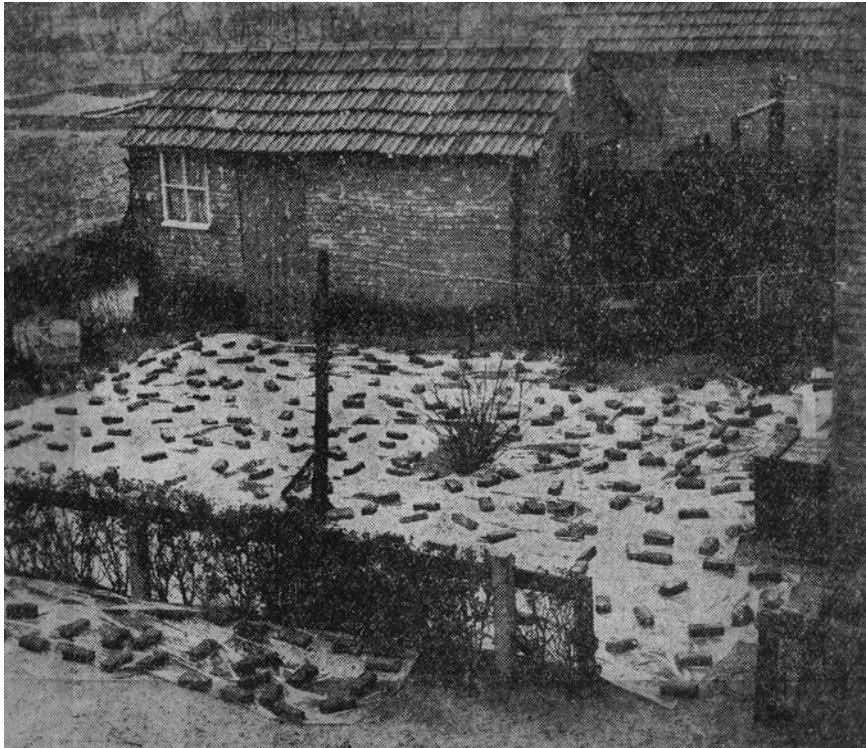


Fig. 9. The garden is covered by a plastic tarpautin, firmly secured with stones.



Fig. 10. Marine personnel with special protective clothing enter the house to start the cleaning operation.



Fig. 11. The protective gear for the cleaning team included gas masks.

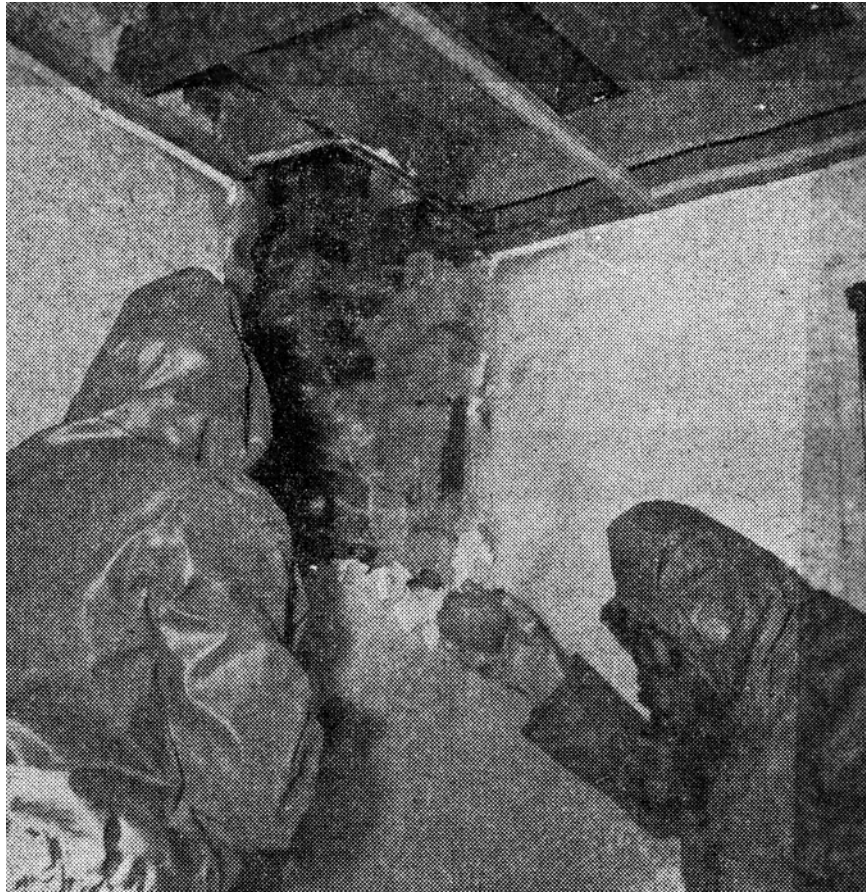


Fig. 12. The chimney is dismantled.



Fig. 13. The concrete drums with radioactive debris are packed in wooden cases. Note the man pointing with a Geiger counter.



Fig. 14. The mayor of Putten welcomes the patient when she returns home after a stay of six weeks at the University Hospital Utrecht.



Fig. 15. The patient at the age of 25 years in 1978. [Permission of publication of this picture has been granted.]



Fig. 16. The patient at the age of 63 years in 2016. [Permission of publication of this picture has been granted.]

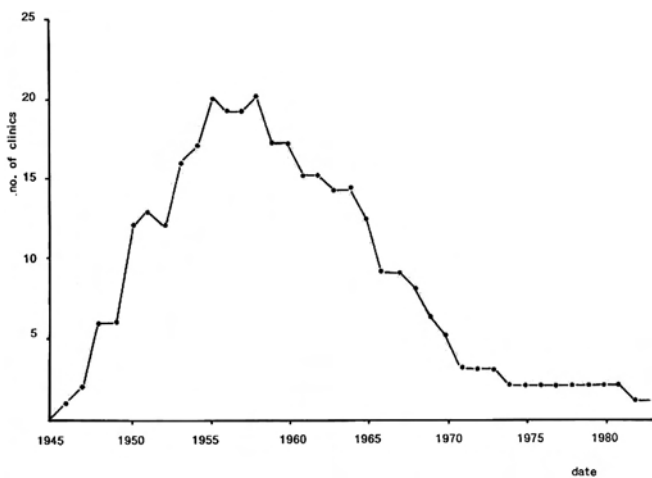


Fig. 17. Numbers of institutions offering nasopharyngeal radium irradiation in the Netherlands between 1945 and 1981. A sharp decline starts after 1958 [4].

It is instructive to see how much impact the mass media - radio, television, and newspapers - can have on medical decision-making. Whereas scientific research is meant to improve medical practice, its influence is limited, in stark contrast to that of mass media. The decline in the application of NRI was not brought about by ongoing scientific investigations and increasing insight. The lesson of history is that accidents and scandals are much more powerful forces for change than scientific evaluations. This is clearly illustrated by the events in the Netherlands in 1958.

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