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Review Articles

Occupational rhinitis: a poorly diagnosed condition

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Abstract
The civil claim of occupational rhinitis may be difficult to prove on the balance of probabilities and is the responsibility of the claimant. There are two types of occupational rhinitis, an allergic rhinitis or a rhinitis due to irritation. Occupational rhinitis can be likened to occupational asthma. Particular attention must be paid to the relationship to alleged exposure and symptoms. Irritation causes symptoms during exposure that cease afterwards unless clinically obvious damage has occurred. Tobacco smoke and nicotine may also cause symptoms. A full examination, both externally and internally of the nose, mouth and eyes should be undertaken. The presence of squamous metaplasia is important. The validity of a claimant's symptoms must be checked against the medical records. Details of all occupations, compounds and protection should be noted. Manufacturing data on the compounds should also be obtained. The Health and Safety Executive publish occupational exposure limits for many industrial chemicals. Allergen-specific IgE may be raised when an allergy is considered to cause the occupational rhinitis. Nasal challenge tests have been used in Scandinavia to diagnose allergic occupational rhinitis. The sense of smell should be tested. There are two approaches, detecting threshold or recognition, which is suprathreshold. When present, three degrees of social effect occur: impairment, disability and handicap. The degree depends on the occupation of the individual.

Key words: Rhinitis; Occupational Diseases; Legal Cases

Introduction

The occupational cause of a rhinitis can be difficult to prove in making a civil claim, even though the necessary standard of proof is only on the balance of probabilities. The burden rests squarely upon the claimant to prove the link between the alleged exposure to the compounds complained of and the nasal symptoms.

Occupational mucous membrane disease is often diagnosed in a medical report when the examining surgeon concludes that the patient encountered an agent or agents at work for a period of time and then developed symptoms, with the conclusion that, because there is no other discerned cause of the rhinitis, then it is due to the occupation.

This sloppy approach in diagnosing PD (D4) has resulted in the DHSS changing the definition of the condition, recognizing (mainly) an allergic rhinitis and (very occasionally) a rhinitis due to irritation.[1] The determination of PD (D4) is an assessment made by a panel, which does not ordinarily include an ENT surgeon but usually has a report from one.

Such a conclusion is often the basis from which a claim against the employer for damages for personal injury, whether in negligence or for breach of statutory duty, proceeds. Regrettably the experts reporting have, on occasions for claimants, made a less than thoughtful or scrupulous analysis. Poor reports result in unnecessary and wasteful litigation.- Given the developing climate in the courts towards the granting of wasted costs orders, caution should be counselled against the writing of such reports or relying upon them.

Allergic and irritative rhinitis

When compiling a report, the examining doctor must recognize that there are two types of occupational rhinitis: an allergic rhinitis or a rhinitis due to irritation. They have different histories.

A true allergic rhinitis requires a period of exposure and sensitization following which symptoms develop on repeated exposure. Rest periods would be expected to give rise to an improvement in the symptoms, with the symptoms disappearing following cessation of exposure to the allergen.

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Initially when rhinitis due to irritation occurs, symptoms are usually transient. However, eventually, the irritation may produce toxic change. That change may or may not be reversible. Symptoms then may, and often do, start as soon as further exposure occurs and will continue with that exposure. There may be little improvement during short rest periods and, if damage is permanent, the symptoms continue after work has ceased but with some improvement. Again, repeated exposure causes exacerbation of the symptoms.

In both types, the symptoms would be expected to start during the occupation and the 'sensitizing' substances must be identified.

Occupational rhinitis can be likened to occupational asthma with which there are many parallels. An allergen or irritant may affect the nose, eyes, mouth, throat and lower respiratory tract. Short reviews of occupational asthma are found in the *ABC of Work Related Disorders*[2] and *Medical Aspects of Occupational Asthma* published by the HMSO.[3] Both make a good starting place for further reading.

While there has been more work undertaken in asthma, it is difficult to determine the prevalence of rhinitis in work populations because of the lack of epidemiological studies. That emphasizes the importance of obtaining an accurate history. If the number of claims increases then it will be necessary to undertake these studies. We would like to emphasize how easy it is to produce inappropriate conclusions.

Chance findings and sample bias

A sample bias may be found in any study that selects people with an alleged disease and then looks at the prevalence of another condition. A sampling error explains the supposed increased prevalence of nasal polyps in the paper on occupational rhinitis by Welch *et al*.[4] Nasal polyps will be more common in a sample of adults with nasal symptoms than in the general population.

Nasal polyps occur in a range of 0.25 to three per cent of the adult population and are more common in men. The age distribution is not equal. They occur most commonly between the ages of 30 and 60 years.[5] The prevalence of rhinitis varies and is put at between five and 15 per cent of the adult population.

Suppose we sample a group of workers with rhinitis. If we accept that rhinitis occurs in 10 per cent and nasal polyps occur in two per cent of the population, where are the polyps patients? Workers with polyps should occur in the group with rhinitis, for they have the same symptoms, not in those who have no nasal symptoms. Let us assume that a workforce has 1000 male workers. Statistically, 100 workers will be expected to have rhinitis, 20 workers will be expected to have nasal polyps. If we link the two samples, as they are not independent, a maximum of 20 out of 100 (20 per cent) of those with nasal symptoms will have nasal polyps. Thus an alleged relationship between nasal polyps and occupation will be made.

If we find this proportion of workers with nasal polyps in a sample of workers, we would be justified in drawing the opposite conclusion. The sample does no more than demonstrate the normal range of nasal symptoms in the workforce and there is no relationship between the study group and occupation!

Nasal symptoms and signs

If the compound irritates then it would be expected to affect all the mucous membranes to a variable extent. Although nose symptoms are most important, the history should determine which other symptoms are present. A variable number of nasal symptoms may occur, including: nasal obstruction, crusting, anterior rhinorrhoea, post-nasal discharge, disturbed sense of smell and taste and epistaxis. A history of eye, throat, skin and chest symptoms should be elicited. The presence or absence should be documented in any report (Table I). Particular attention must be paid to the relationship to alleged exposure.

Past medical history

A history of hay fever and rhinitis during childhood should be investigated as well as any family history of these conditions. A family history of allergic diseases in first-degree relatives should be sought. Details of any diseases, particularly cardiovascular and central nervous system problems, should be documented along with details of all medication received. A 'smoking' history should be taken, which includes cigarettes, with details of past and current habits, including the daily numbers smoked and details of each period of such habit. Many of the nasal symptoms complained of can be attributed to tobacco, and cigarette smoking often confuses the picture. Miners do not smoke underground but take snuff instead, which is potentially toxic to the nasal mucosa.[6] Tobacco smoke and nicotine may also cause symptoms and quite quickly.[7] Occasionally, cocaine or other drugs may have been taken over a period of time. A history of alcoholic intake may be material.

Examination

A full examination, both externally and internally of the nose, mouth and eyes should be undertaken.

The colour of the nose is remarkably variable and little weight should be given to the variations found. The shape of the external nose and position of the septum internally and externally should be documented. Crusting behind the muco-squamous junction is exceptionally important to document, as is the nature of the secretions. Crusting should occur on both sides if the airway is patent. Ulceration of the nasal septum and perforation may occur, particularly in chrome workers. Endoscopic examination will show any problems in the middle meatus and posterior nasal space but should be undertaken after the sense of smell has been assessed, particularly if local anaesthesia is used. Areas of squamous metaplasia will be seen and should be correlated

TABLE I
SYMPTOMS ASSOCIATED WITH OCCUPATIONAL RHINITIS

Nose symptoms	
Blockage	Side, duration and frequency in relation to causative agents
Crusting	Side and frequency (this should be present in the nasal cavity)
Anterior rhinorrhoea	Side, colour, duration, frequency and triggers
Post nasal discharge	Duration, colour and frequency
Smell and taste	Change and ability to taste sweet, sour, salt and bitter
Epistaxis	Side, frequency and duration
Chest symptoms	
Asthma	
Cough	
Wheeze	Duration and frequency in relation to causative agents
Dyspnoea	
Sputum	
Mouth and throat symptoms	
Sore lips	
Chelitis	Duration and frequency in relation to causative agents
Pharyngitis	
	Beware nocturnal mouth breathing and snoring
Eye symptoms	
Redness	
Irritation	Duration and frequency in relation to causative agents
Runing	
Skin symptoms	
Eczema	
Redness	Duration and frequency in relation to causative agents
Exfoliation	

with the history to irritants. From the symptoms and examination, it is possible to give an idea of the condition and this should be matched to the occupational history.

Occupational history

If possible, a report should contain details of all occupations and compounds in respect of which the claim is being made, of whether any, and is so what, protection has been used and whether it was supplied by the work place. Manufacturing data on the compounds should also be obtained from the manufacturers to note the safety and side-effects.

Unfortunately, many claims are made when works have closed or the conditions have changed. The picture often painted is of a factory in the dark industrial lands. Unless the doctor examining the claimant has a proper and informed understanding of the industrial process involved, consideration should be given to an informed engineer's report. The conditions in mining may vary, as can the work of those involved.

The circumstances of the exposure must be thoroughly investigated and the work activities explored to determine the nature of the substances involved. The nature, duration and frequency of exposure should be documented. In addition, the working conditions at the site of the alleged exposure must be ascertained in order that the effectiveness of extraction/ventilation can be assessed. Chemicals, which cause severe irritation, will quickly become intolerable to the workforce and the exposure will be limited as a result. The substance or substances may be a gas, vapour or particulate. Sometimes the conditions will result in a mixture of compounds. Particle size is important, as larger or heavier particles will not stay in the air for long. The nature of the material has a direct relationship to the sites of toxicity in the body.

Only with these data can an informed opinion be made about the dose–effect relationship of the substance to the alleged nasal damage with any degree of reliability. Substances with mild irritant properties will only produce effects at very high levels of exposure and, under normal circumstances, may not be expected to have any detrimental or long-term effect on the worker. The conditions of exposure are just as important as the chemical nature of the substances themselves.

Clinical findings and results of investigations are not specific to occupationally induced disease. The diagnosis of an occupationally induced nasal disorder on the balance of probability needs to be founded on the occupational history and the temporal onset and history of the symptoms alone, with the exclusion of other unrelated causes, not forgetting physical causes, including such defects as a deviated nasal septum.

It is our opinion, therefore, that there should be a good history of a temporal association between the alleged exposure and onset and occurrence of symptoms. In the early stages the early symptoms should resolve when the claimant is not exposed, e.g. when on holiday or at weekends. There is a certain point at which the symptoms and condition become irreversible and therefore the symptoms may remain after employment has ceased. We consider that any symptoms first arising a significant time after the exposure complained of or the employment has ceased will not be due to that alleged exposure. We would expect an individual to be aware of irritative or corrosive effect on the nasal/respiratory linings, certainly in the earlier stages of employment.

According to classic immunology, in mucous membrane disease of an allergic/hypersensitive variety, an individual cannot become sensitized to an agent in an allergic sense without having been exposed to that agent in the first place.

Chemicals identified

Chemicals used in the process should have been identified by this stage. Their toxicity needs to be established. The Health and Safety Executive publish occupational exposure limits for many industrial chemicals. The occupational exposure standard is the airborne concentration of a substance to which employees may be exposed without there being a known significant risk of an adverse health effect. The maximum exposure limit (MEL) is the maximum concentration of airborne substance to which an employee may be exposed under any circumstances. These have been arrived at on the basis of research studies into the toxic effect of industrial chemicals.

There are a number of compounds that have been identified and shown to be either allergenic or toxic (Table II).[8,9] If there is doubt about the nature of the compound then a textbook such as *Hunter's Diseases of Occupations* should be consulted.[10] A thorough text on the nature of irritation and damage may be found in the publication of a symposium on industrial rhinitis.[11] A compound that causes respiratory tract symptoms may well cause other problems and the toxicology of each chemical should be examined. Thus, there is little point in noting that volatile aromatic hydrocarbon compounds may cause irritation of the nose and attributing the nasal condition to exposure to such compounds when such reaction only occurs with levels so high that they would be expected to have produced other and significant effects, such as drowsiness, cerebellar signs and ataxia. Such attribution has been encountered in a number of expert reports for claimants, which contain a list of alleged compounds and every side-effect that might be conceived of, with little regard to the actual working conditions and toxicology, or to the claimant's experience. The presence or absence of what might be expected to have occurred, given the exposure described if the attribution is correct, must be considered.

The effects of long-term exposure on low doses of chemicals remain uncertain. There is little found in published literature to suggest that such exposure leads to chronic rhinitis. The threshold for disease becoming irreversible has not been defined and probably varies from individual to individual in relation to each alleged irritant.

Outside interests

Any activities that could contribute should be noted and compounds documented. Some hobbies such as woodworking may be relevant.

General practice and occupational medical records

The record of a claimant's symptoms must be checked to ensure the validity of the history. We have found a history of rhinitis or anosmia predating the alleged exposure in some cases. If the medical records are not available at the time of examination, a statement should be made in the report to this effect, saying that a supplementary report will be made when they become available.

Observation of the ultimate result of a number of claims has shown that reporting without having had a full personal history and a detailed consideration of the claimant's full medical records has been unfortunate.

Effects of medication

All prescribed and proprietary medication taken needs documenting and evaluating. Workers may use various nasal sprays designed to treat symptoms, producing the long-term damage – a rhinitis medicamentosa. Vasoconstrictor agents such as Vick's, Synex, Afrazine, Otrovine etc., and topical nasal steroids can produce epistaxis. The use of systemic hormone treatment can also produce nasal symptoms as can the effect of drugs, which inhibit prostaglandin synthesis such as aspirin etc. Alpha blockade used for prostatic symptoms also may have

TABLE II
THE GROUPS OF COMPOUNDS KNOWN TO CAUSE RESPIRATORY DAMAGE

Activity	Agents
Plastic industry, paints – spraying etc, epoxy resin use, rubber industry	Isocyanates and related compounds
Soldering	
Electrical	Colophony
Aluminium	Aminoethyl ethonolamine
Welding	Various compounds, depending on job
Organic materials	
Bakers	Grains
Furniture	Wood dust
Laboratory	Animal urine and danders
Farming, racing	Larger animal danders
Various	Enzymes
Pharmacy	Many compounds
Healthcare	
Sterilizing	Gluteraldehyde (Cydex)
Theatre	Latex

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an effect on the nose. The treatment of hypertension with beta-blockers can act via the sympathetic system causing congestion of the nasal mucosa and nasal blockage. Antidepressants can produce a dry nose and a dry mouth, as can angiostensin-converting enzyme inhibiting agents such as Captopril.

Investigations

If allergies to dust mite etc. are suspected, these can be supported by a skin test. Allergen-specific IgE may be raised when an allergy is considered to cause the occupational rhinitis. Nasal challenge tests have been used in Scandinavia to diagnose allergic occupational rhinitis and should be undertaken with an objective measurement of nasal patency such as acoustic rhinometry. The nose is hyperreactive when allergic and non-specific triggers may induce symptoms, including the saline placebo challenge. A delayed reaction may occur after 24 hr.

The sense of smell should be tested. There are two approaches, detecting threshold or recognition, which is suprathreshold. Suprathreshold testing is better to assess malingering. There are three commercially available tests: the Connecticut Chemosurgery Clinical Research Centre (CCCRC) test, the University of Pennsylvania Smell Identification Test (UPSIT) scratch cards (from the USA) and 'Sniffin Sticks', but these are unfortunately not widely available in the UK. All have been validated. If the sense of smell is declared to be deficient, then peppermint should be used as well as ammonia. Both have an effect on the sensory mucosa of the fifth cranial nerve. At least one of the contributions to taste of the tongue should be tested – sweet, sour, salt or bitter, to test the veracity of the claims. The great advantage of undertaking a saccharin transit time is that it relies on the other cranial nerves and will show whether the mucociliary system is intact. This will be the first line of defence to be destroyed. These tests add weight to the report and are best included.

Nasal disease

Nasal and sinus disease is exceptionally common. A quarter of the population is at risk of developing allergic rhinitis and 10–15 per cent of people in the UK do so. One per cent of the population has nasal polyps and chronic sinusitis. Many people have colds and sinusitis. Forty per cent of the population has changes in one or more of the sinuses when examined using CT or MRI scans. Mucous membrane disease needs to be demonstrated when this is taken into account: it is not enough just to document nasal and sinus symptoms.

Function of the nose

The nose warms, filters and humidifies the inspired air. It also acts on expired air to remove excess moisture and cools the air. The nose filters out particles down to 30 μm. Some degree of inflammation may be present in most noses because of the nasal function. If particles are deposited on the nasal mucosa, the mucociliary transport system moves them to the back of the nose and they, together with the mucus, are swallowed. It is a vulnerable system and is easily compromised.

Inhaled agents may be particulate or gaseous. If the material inhaled as part of an industrial process is dust then, depending on the particle size, it should be deposited in the nose rather than the lungs (if nose breathing occurs). Symptoms should develop soon after exposure. A mask may be an effective barrier. If the agent is gaseous, then it should affect both the lower and the upper respiratory tract to some degree. The chest is less robust than the nose and is more vulnerable. Further details on the physiology of the nose may be found elsewhere.[12,13] Many processes involve heavy manual labour and so the nose is bypassed for much of the time when the workers are mouth breathing.

Disability

Three terms are defined in this section – impairment, disability and handicap. Olfactory loss is the easiest example. *Impairment* represents an abnormality of function and in this sense could represent inability to smell properly. *Disability* results from impairment and causes a loss of capacity to perform functions that are considered normal. The third term is that of *handicap*, where the loss has a direct bearing on the occupation of the individual. All are relevant to the Court's assessment. The loss of sense of smell would arguably pose a great handicap to a Cordon Bleu chef or wine taster but less so in a retired person. Quantifying the loss requires an assessment of the individual.

Disability in occupational nasal disorder can be from nasal obstruction, persistent nasal discharge, persistent sneezing, snoring and abnormalities of taste and smell. The inability to smell may be considerably disabling, particularly in respect of smell substances dangerous to life, e.g. a gas leak. This is a difficult aspect of mucous membrane disease to quantify. Some specialists preparing reports use an arbitrary subjective scale as a means of calculating percentage disability or handicap. There is no scientific basis for these scales at the present time but a precedent for them exists in the assessment made in DHSS cases for prescribed occupational disease PD (D4).

Conclusion

Some occupations are alleged to cause industrial rhinitis and yet the condition is noted only in certain areas of the country. Welding occurs throughout Great Britain but there is a tendency for mucous membrane disease to occur (or rather litigation to happen) in the Northeast and Northwest of England. Such an inconsistency, as with any other inconsistency, should, in a proper report, be addressed. The post-hoc propter hoc approach referred to at the beginning of this article will not suffice.

The diagnosis of occupational rhinitis is not easy as there is very little evidence-based medical research establishing what substances cause non-allergic rhinitis. There are no specific features on history, examination and on the results of investigations. The attribution will be made upon the balance of probability.

The Courts may have a very difficult task in deciding whether the worker complaining of nasal symptoms has developed these from exposure to a substance in the course of his work. Doctors reporting have to recognize that rhinitis is very common in the general population. Furthermore, certain medications or other conditions may give rise to nasal symptoms. Self-medication with over-the-counter preparations such as topical nasal decongestants may complicate the picture. Smoking, exposure to passive smoking and urban atmospheric pollution, personal habits, alcohol intake and full health history must be taken into account.

Having decided that a worker has occupational rhinitis, an assessment of the resulting damage to the nasal mucous membranes has to be made, and an opinion expressed as to the impairment of nasal function and the prognosis.

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