Why is squint surgery in children in decline?
C J MacEwen, H S Chakrabarti

Background/aims: Paediatric squint surgery appears to be declining. This study aims to identify if this is so and, if so, why.


Results: (1) Overall, a 58% fall in surgery in Scotland and 59% in Tayside. For esotropia, a reduction of 63% (Scotland) and 69% (Tayside). (2) Incidence of esotropia was unchanged; surgery for these esotropes fell (from 55% to 30%) (p = 0.013). More children received maximum hypermetropic correction (p < 0.001) and more developed stereopsis (p = 0.003).

Conclusion: Childhood strabismus surgery, particularly for esotropia, is declining. The maximum hypermetropic correction given improved the functional results.

A dramatic fall in the rate of paediatric squint surgery was reported in the 1970s and 1980s. Suggestions for this included a reduction in the incidence of children with esotropia, improved screening, and better child health. This study aims to identify if there has been a continued reduction in strabismus surgery in children and to assess contributory factors.

MATERIALS AND METHODS
This study was carried out in two parts: (1a) identification of the incidence of paediatric strabismus surgery in Scotland from 1986 to 2001; (1b) identification of the incidence of paediatric strabismus surgery in Tayside in the same period; (2) a retrospective case review of children presenting to the orthoptic service in Tayside in 1986 and 1996.

Scotland
The Information and Statistics Division (ISD) (NHS, Scotland) provided raw data regarding strabismus operations performed in Scotland in children under 15 between 1986 and 2001 (inclusive). This information is gathered from all Scottish hospitals via Scottish Morbidity Record forms (SMR 1) and records discharge data on all patients treated as inpatients or day cases.

Tayside
Ophthalmic surgical log books for Tayside region (1986–2001 inclusive) were reviewed to identify frequency of squint operations in the under 15 population each year.

Incidence of esotropia
A registration logbook identified all children presenting to the orthoptic service in Dundee City (the largest component of Tayside region) in 1986 and 1996. The presenting diagnosis was observed and information was recorded for children with esotropia. Presenting age and size of squint, retinoscopy findings, and spectacle correction prescribed (the prescription given compared with retinoscopy findings), first corrected visual acuity, any surgical intervention and visual acuity, size of squint, and degree of stereopsis at discharge were recorded for esotropes.

Acuity measurements were converted into logMAR. Retinoscopy measurements were the maximum hypermetropia identified under cycloplegic refraction (cyclopentolate 1%) and are presented as the sum of both eyes.

Intentional undercorrection of hypermetropia is defined as the number of dioptres by which the spectacle prescription is reduced, once working distance was subtracted from retinoscopy. The results are presented as the sum of the intentional undercorrection for both eyes.

Stereopsis was measured using Frisby, TNO, Wirt fly, or Titmus and was classified as “fine” (55 seconds of arc or better), “gross” (<55 seconds of arc), and “none” (unable to detect stereopsis).

Probability curves were plotted of the data that revealed non-parametric tests to be most appropriate for all sets of data. Statistical analysis was carried out using the Mann-Whitney U test.

RESULTS
Scotland
The number of squint operations carried out in children in Scotland fell from 1891 in 1986 to 797 in 2001, a fall of 58% (fig 1A). The number undergoing surgery for esotropia fell by 63% from 1361 in 1986 to 505 in 2001. Children undergoing surgery for exotropia fell by 11% from 170 in 1986 to 151 in 2001.

Tayside
The number of squint operations in children in Tayside in 1986 was 180 and in 2001 was 73 (fig 1B), a 59% drop. The number of children undergoing surgery for esotropia fell by 69%—from 138 (1986) to 43 (2001). Children undergoing surgery for exotropia fell by 24% (21 in 1986 and 16 in 2001) (fig 1B).

The under 15 population in Scotland and Tayside region remained constant.

Incidence of esotropia
Eighty nine children presented with esotropia in 1986 and 70 in 1996. This incidence was unchanged (34.5/10 000 in 1986 and 33.1/10 000 in 1996).

In 1986 the mean age at presentation was 3 years 6 weeks (range 36 weeks to 14 years) and in 1996 it was 3 years 2 weeks (range 28 weeks to 11 years) (p = 0.54).

In 1986 the mean angle at presentation was 30.40 dioptres (SD 15.55) and in 1996 was 25.31 dioptres (SD 14.04) (p = 0.0712). In 1986 the mean retinoscopy findings were 7.86 dioptres (SD 5.03) and in 1996, 6.85 dioptres (SD 4.17) (p = 0.452). In 1986 the mean undercorrection prescribed was 2.02 dioptres (range 0–7) and in 1996 it was 0.76 dioptres (range 1–4.75), (p <0.001). Presenting visual acuity was a mean of 0.52 (logMAR) in 1986 (SD 0.40) and 0.54 in 1996 (SD 0.43) (p = 0.623).
In the 1986 group 44 of the 89 esotropes underwent surgery (55%), in the 1996 group 21 out of 70 (30%), (p = 0.013). At discharge, in those presenting in 1986 the mean angle was 12.23 dioptres (SD 10.49) and 12.20 dioptres (SD 8.66) in 1996, (p = 0.62); the visual acuity was a mean of 0.28 (logMAR) (SD 0.35) in 1986 and 0.36 (SD 0.34) in 1996, (p = 0.085) and esotropes presenting in 1996 had better stereopsis (p = 0.003) (fig 2).

**DISCUSSION**

This study has identified a dramatic drop in the rate of squint surgery in Scottish children between 1986 and 2001. A decline in childhood squint surgery has previously been reported, with a 42% fall between 1968 and 1985 in west Berkshire, and a reduction in Oxford between 1975 and 1985 averaging 5.2% per annum. Our study establishes that this fall has continued over the next 15 years in Scotland. A similar trend has been reported in England, with a 41% reduction in paediatric squint operations between 1989–90 and 1999-2000.  

In the 1986 group 44 of the 89 esotropes underwent surgery (55%), in the 1996 group 21 out of 70 (30%), (p = 0.013). At discharge, in those presenting in 1986 the mean angle was 12.23 dioptres (SD 10.49) and 12.20 dioptres (SD 8.66) in 1996, (p = 0.62); the visual acuity was a mean of 0.28 (logMAR) (SD 0.35) in 1986 and 0.36 (SD 0.34) in 1996, (p = 0.085) and esotropes presenting in 1996 had better stereopsis (p = 0.003) (fig 2).

Effective conservative management in the form of the maximum hypermetropic spectacle correction has had a role in improving the control of accommodative esotropia with a resultant improvement in the functional outcome and a reduced surgical requirement.

**Authors’ affiliations**

C J MacEwen, H S Chakrabarti, Ophthalmology Department, Ninewells Hospital and Medical School, Dundee, UK
Correspondence to: Miss Caroline J MacEwen, Ophthalmology Department, Ninewells Hospital and Medical School, Dundee, UK; c.j.macewen@dundee.ac.uk

Accepted for publication 22 January 2003

REFERENCES


3. Finlay R. Number of squint operations in Britain has decreased. BMJ 2000;320:938.


