

## **5. Current treatment of rhegmatogenous retinal detachment**

### **5.1. Introduction**

The choice of operating method in the treatment of RRD depends on the anatomical situation, the technical facilities available, the experience and the individual preferences of the surgeon. Until the 1990s, SBS was the standard operating method in the vast majority of primary cases in Europe, Japan as well as in the USA. Since then, pneumatic retinopexy appears to have evolved as the most popular first-line treatment in the USA [59, 102]. In Europe and Japan, PPPV is gaining widespread popularity and, in some centres, is applied in either numbers comparable to those of SBS or even in the majority of cases [19, 68, 69, 75]. The growing number of choices, further increased by the additional possibilities of combining the methods with each other, has led to the current situation in which significantly different methods are applied in identical or comparable situations of RRD [7]. In this section, the available literature regarding the choice of operating method is reviewed, the preferences in the CCBF over a ten-year period are analyzed and details of the “Recruitment Study” regarding the choice of operating methods are disclosed.

### **5.2. Review of the literature**

A total of 14 series of RRD surgery published in the last ten years and providing details about the choice of operating methods used were identified in a medline search. The percentage of SBS varied between 0% [98] and 63% [69]. Table 4 summarizes the different percentages of SBS and PPPV in recent series of retinal detachment surgery. In four series, details about the choice of operating methods at different timepoints were presented. Table 5 compares the percentage of PPPV in different consecutive series of retinal detachment surgery within the same institution at different timepoints. In all institutions, a significant rise in the percentage of PPPV are to be noted. Table 4 and Table 5 emphasize the definite trend towards PPPV in the treatment of RRD in recent years.

Author, year of publication	Years of surgery	n	% PPPV	% SBS
Johnson 2002 [50]	1987-1989	135	2%	98%
Girard 1995 [32]	1985-1992	290	10%	90%
Höing 1995 [48]	1992	300	11%	89%
Bonnet 1996 [10]	1984-1993	409	35%	65%
Van Tricht 1998 [98]	1995-1996	104	0%	100%
Sullivan 1997 [93]		153	34%	66%
Ah-Fat 1999 [2]	1996	124	32%	68%
Oshima 1999 [74]	1993-1996	378	17%	83%
Wong 1999 [107]	1993-1996	1228	49%	51%
Comer 2000 [19]	1995-1997	148	46%	54%
Oshima 2000 [75]	1993-1999	563	25%	75%
Miki 2000 [68]	1990-1996	225	39%	61%
Minihan 2001 [69]	1999	126	63%	37%
Johnson 2002 [50]	1996-1997	142	49%	51%

**Table 4: Percentage of PPPV and SBS in individual series of RRD-surgery**

Author, year of publication	Years of surgery First vs. last survey	Percentage PPV First vs. last surgery
Sullivan 1997 [93]	1969 vs. 1997	0% → 44%
Comer 2000 [19]	1989 vs. 1997	0% → 46%
Ah-Fat 1999 [2]	1987 vs. 1996	0% → 32%
Minihan 2001 [69]	1979 vs. 1999	0% → 63%

**Table 5: Percentage of PPPV in two different series from the same institution**

### 5.3. Disadvantages of scleral buckling surgery

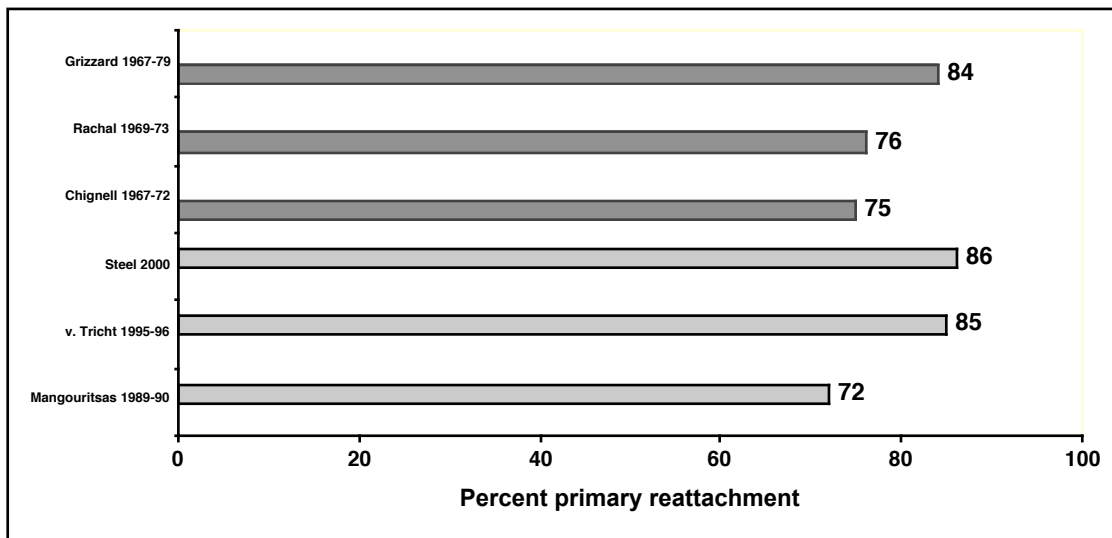
Since the introduction of scleral buckling techniques by Ernst Custodis in 1949 and their subsequent refinements [22, 63], SBS has been and still is the fundamental and most important technique in the surgical treatment of RRD worldwide. However, one of the major reasons for the current trend towards PPPV is the persistence of complications associated SBS which have not been lessened in recent years. These are essentially permanent anatomical and functional failures and detrimental intraoperative and postoperative complications (e.g. choroidal haemorrhage, motility disorders and explant infections).

### 5.3.1. Anatomical and functional results

SBS achieves extremely high success rates up to 100% reattachments in patients with relatively uncomplicated situations, e.g. single retinal hole with good view of the fundus and limited surrounding detachment [72]. In consecutive unselected series and more complicated situations, the success rates are definitely lower (Table 6). Of substantial interest is the fact that SBS seems to have reached a level of little variation regarding the success rates in recent years (Table 6, Figure 2). No significant technical advances or increased success rates can be seen comparing older to recent series of SBS for RRD [11].

Author, year	n	Reattachment primary	final	Visual acuity $\geq 0,1$	$\geq 0,3$	$\geq 0,4$	$\geq 0,5$	PVR
Han 1998 [38]	50	84%		96%		64%		8%
Van Tricht 1998 [98]	104	86%	100%	95%			69%	2%
Framme <sup>†</sup> 2000 [29]	86	83%	95%	95%		70%		4%
Hooymans 2000 [49]	152	82%	96%		68%			6%
La Heij 2000 <sup>  </sup> [57]	80	81%	99%	96%	88%	80%		11%
Oshima 2000 [75]	55	91%	100%			52%		3,6%
Steel 2000 <sup>  </sup> [92]	120	88%	100%	96%	79%			4%

**Table 6: Success rates of recent series of SBS** (<sup>||</sup>= selected cohort of patients)



**Figure 2: Percent of primary reattachment in series of SBS before 1980 [17, 34, 79] and after 1990 [66, 92, 98]**

### **5.3.2. Intra- and postoperative complications**

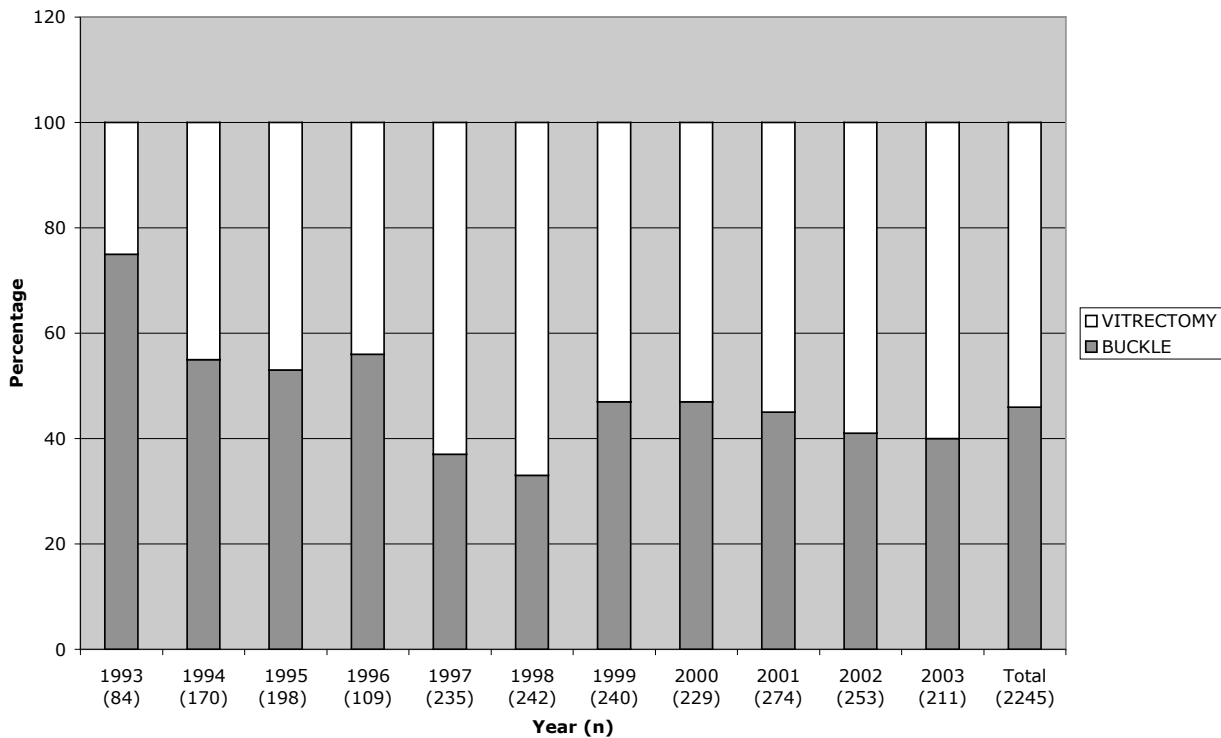
One of the major reasons for the current trend towards PPPV is that SBS is associated with a “galaxy” of possible intra- and postoperative problems [67, 91]. The evaluation and summary of these complications is influenced by the fact that there is a great diversity in the technical details of the procedures and several problems are specifically linked to particular intraoperative steps, e.g. drainage of subretinal fluid and subretinal haemorrhage. Reviewing the current literature, persistent and most likely unsolvable problems associated with SBS and their estimated percentages are:

- Scleral perforation 3% [57]
- Retinal incarceration 2% [49]
- Chroidal haemorrhage 4% [57]
- Choroidal detachment 4% [57] 8% [92]
- Severe postoperative pain 1% [57]
- Macular pucker 1% [57, 92]
- Persistent diplopia 1% [57]
- Infection and/or extrusion of buckling material 1% [82]

### **5.4. Operating methods at the Department of Ophthalmology, CCBF**

The Department of Ophthalmology at the CCBF is a tertiary referral centre for vitreoretinal diseases and, regarding the number of RRD treated per year, is amongst the major vitreoretinal departments in Germany (Figure 4). As the major vitreoretinal surgeons of the department were amongst the first ones to use PPV in daily practice in Europe at the Department of Ophthalmology in Essen, Germany, PPPV for RRD was introduced to the CCBF in 1992 following the change in headship of the department. To study a possible change in the choice of operating methods in the department in the last decade, all retinal detachments that were operated on over a 10-year period were identified in the database of operating notes (FileMaker 4.1). Patients with redetachments, proliferative diabetic retinopathy, previous vitreoretinal surgery (except laser-photocoagulation or cryopexy) and a history of ocular trauma were excluded from analysis. We detected a total of 2245 operations over a 10-year period in the database.

There were between 84 (1993) and 211 (2003) surgical procedures of RRD per year (minimum 84, maximum 274, mean 204, median 229, Figure 3). The percentage of PPPV increased from 25% in 1993 to 60% in 2003. Overall, 54% (1232/2245) of operations were PPPV compared to 46% SBS (1013/2245).



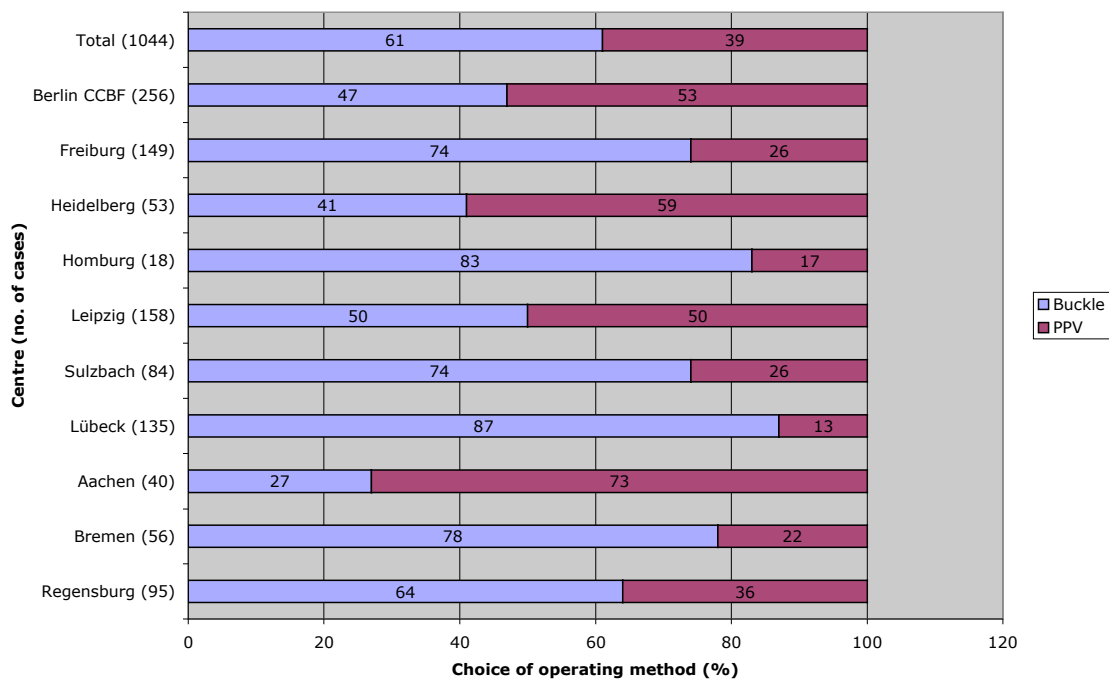
**Figure 3: Percentage of SBS (buckle) and PPPV (vitrectomy) between 1993 and 2003 at the Charité, Campus Benjamin Franklin**

### 5.5. Results of the “Recruitment Study”

Recruitment lists of all primary RRD in participating centres were accomplished as part of the SPR Study (Chapter 4.3, in preparation for publication) [28]. Only preliminary data is presented here (see remark in chapter 4.3.2). In one part of the questionnaire, the intended operations for all patients were documented (Figure 1). Out of 10 centres, coherent data was submitted regarding this issue for the year 2000, providing information about 1044 cases of RRD. As in clinical practice, there was a great variety in the possible combinations of operating methods. However, the answers could be

grouped into two different groups, SBS and PPPV (Figure 4). These figures may not reflect the true choice of method as some cases had “missing” values and the operation finally performed could differ from the intended method. However, these figures still provide a good indication regarding the current choice of operating methods in Germany.

Overall, SBS was planned in 61% (641/1044) and PPPV in 39% (403/1044) of cases. There was a significant range in the percentage of SBS, ranging from only 27% to 87% of operations.



**Figure 4: Choice of operating method in 10 different centres in the year 2000 (SPR recruitment study)**

## 5.6. Summary

In summary, the review of the literature, the operations performed in the CCBF over the past 10 years and the operating methods provided in the SPR recruitment list reveals that:

- At present, there is a large variety in the choice of operating methods in different centres worldwide
- Overall, SBS still is the operating method used for the majority of patients with RRD in Germany
- In several centres in Europe and Germany, however, PPPV currently already is the most popular operating method for the treatment of RRD
- SBS still is associated with potentially hazardous complications associated with procedure itself
- Functional and anatomical results of SBS have not improved in the past 20 years but seem to have reached a plateau with around 10% of patients with final anatomical and functional failures

As a matter of fact, on a German and European basis, theoretically identical situations of RRD are currently treated with completely diverging operating methods. Because it is highly unlikely that different operating methods achieve equivalent results and are accompanied by a similar spectrum of complications, a prospective trial in consequence is justified and needed [105]. This underlines the need the SPR Study and its likely impact on clinical practice.