



The Herbst Appliance

Research-based Clinical Management

Hans Pancherz
Sabine Ruf

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Preface

After Emil Herbst introduced his bite jumping mechanism in 1909, it achieved some initial popularity, but from 1934 onwards there were very few references to the treatment method in literature until its reintroduction in 1979 by Pancherz. Due to the many clinically oriented research papers of Pancherz and co-workers (1979 onwards) and of other authors (1981 onwards), the appliance has become very popular all over the world.

The intention of this book is to present research-based clinical use of the Herbst appliance in the management of Class II malocclusions. Therefore, in

the various chapters, different clinical problems and questions are addressed in light of the existing research. Most of the relevant scientific investigations referred to are those performed in Malmö, Sweden (1979 - 1985), and in Giessen, Germany (1985 onwards). Over a period of almost 30 years, the research activities in these two institutions have resulted in 75 publications, 22 doctoral and 3 PhD theses. Thus, in contrast to many other Class II treatment alternatives, the Herbst appliance approach is essentially based on scientific evidence.

Acknowledgement

We would like to express our warmest and most sincere thanks to Mr. Hartmut Meyer, our photographer at the Department of Orthodontics.

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Hans Pancherz
Sabine Ruf

About the authors



Hans Pancherz, DDS, Odont. Dr. (PhD), received his dental and orthodontic education at the School of Dentistry, University of Lund in Malmö, Sweden. He became a certified specialist in Orthodontics in 1974. In 1976 he finished his PhD thesis on “Long-term effects of activator (Andresen appliance) treatment”. From 1975 to 1985 he was Associate Professor at the Orthodontic Department, University of Lund. In 1985 he was appointed Chair Professor at the University of Giessen, Germany, where he served from 1985 until 2005.

Professor Pancherz has published 140 scientific articles, 72 of which deal with the Herbst appliance. He has been invited as lecturer at more than 200 national and international conferences all over the world and has received numerous awards and honors. At the Dental Faculty in Hong Kong, Professor Pancherz served as Honorary Professor in 1996 and 1997 and as Visiting Professor in 2007. He was Keith Godfrey Visiting Professor in Sydney in 1997. Furthermore, he acted as External Examiner for the Masters in Orthodontics in Hong-Kong in 1996 and 1997 and in Sydney in 1997 and 2006. Moreover, he is Editorial Board Member of several orthodontic journals. Professor Pancherz is particularly interested in clinical research, focusing on functional appliances and their effects on growth, electromyography of the masticatory muscles and long-term evaluation of dentofacial orthopedic interventions.



Sabine Ruf, DDS, Dr. med. dent. habil. (PhD) received her dental, orthodontic and scientific degrees from the School of Dentistry, Justus-Liebig-University of Giessen, Germany. In 1994 she obtained her Dr. med. dent. with the thesis entitled: “Facial morphology, size and activity of the masseter muscle”. She became a certified specialist in Orthodontics in 1995. Thereafter, in 2001 she was granted the degree of Dr. med. dent. habil. (PhD) with the thesis entitled “Influence of the Herbst appliance on mandibular growth and TMJ function”. From 2002 to 2005 she served as Professor and Chair of Orthodontics at the School of Dentistry at the University of Berne, Switzerland. Since October 2005 she has been Professor and Chair of the Department of Orthodontics at the Justus-Liebig-University of Giessen.

Professor Ruf has published 50 articles, 20 of which deal with the Herbst appliance. She has been an invited lecturer at 50 national and international conferences and has received several awards and honors. Additionally, she was active as Visiting Professor at the Dental Faculty at Hong Kong University in 1997, where she also served as External Examiner for the Masters in Orthodontics in 2005. Furthermore, she is Editorial Board Member of several orthodontic journals and was Meeting President of the German Orthodontic Society in 2007. Professor Ruf is especially interested in clinical research, focusing on functional appliances and their effect on masticatory muscle and TMJ function.

Contents

1	Historical background	1
2	Dentoskeletal characteristics of Class II malocclusions.	3
3	Design, construction and clinical management of the Herbst appliance	11
4	Derivates of the Herbst appliance	27
5	Experimental studies on bite jumping	31
6	Herbst research - subjects and methods	43
7	Short-term effects on the dentoskeletal structures	55
8	Long-term effects on the dentoskeletal structures.	67
9	The headgear effect of the Herbst appliance.	85
10	Effects on TMJ growth	93
11	Effects on mandibular growth and morphology	101
12	“Effective TMJ growth”	107
13	Effects on the skeletofacial growth pattern	113
14	Effects on the facial profile.	121
15	Effects on muscular activity	129
16	Effects on TMJ function	135
17	Treatment of the retrognathic and prognathic facial type.	145
18	Treatment of hyper- and hypodivergent Class II:1 malocclusions	153
19	Anchorage problems	161
20	Effects on anchorage teeth and tooth-supporting structures.	171
21	Treatment indications.	181
22	Treatment timing	213
23	Treatment of adults – an alternative to orthognathic surgery.	225
24	Complications	243
25	Relapse and retention	253
26	Concluding remarks.	261
	Contents Index	263

Chapter 3

Design, construction and clinical management of the Herbst appliance

With respect to the design and construction of the Herbst appliance there are two important factors to be considered: anchorage control and appliance durability. In modern times, however, instead of paying attention to these things, emphasis has frequently been placed on making the appliance simpler and less expensive.

In order to make the clinician aware of the above factors and to help him to avoid unwanted (uncontrolled) tooth movements and appliance breakages/dislodgements this chapter will deal with different designs of the Herbst appliance, their construction and clinical management.

Appliance design in the past

The standard anchorage form used by Herbst (1910, 1934) is shown in Fig. 3-1. Crowns or caps were placed on the maxillary permanent first molars and mandibular first premolars (or canines). The crowns or caps were connected by wires along the palatal surfaces of the maxillary teeth and the lingual surfaces of the mandibular teeth to distal of the mandibular molars.

In cases in which the maxillary second permanent molars were not erupted, Herbst found it advisable to anchor the appliance more firmly by placing bands also on the maxillary canines, which were soldered to the palatal arch wire as were the maxillary molars (Fig. 3-2). Alternative to bands on the maxillary canines, a thin gold wire on the labial surfaces of the maxillary incisors, also soldered to the palatal arch wire, was utilized (Fig. 3-3).



Fig. 3-1 Herbst's standard anchorage system. (Revised from Herbst 1934)

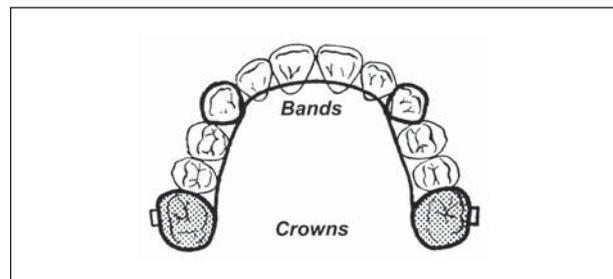


Fig. 3-2 Herbst's maxillary anchorage system when the second permanent molars were not erupted - bands on canines. (Revised from Herbst 1934)

Dental arch relationship

During the first observation period both overjet and sagittal molar relationship were significantly improved in the Herbst sample. In addition to the mandibular skeletal changes mentioned above, this was accomplished by maxillary and mandibular dental changes: the maxillary teeth were moved posteriorly and the mandibular teeth were moved anteriorly (Pancherz 1982, Pancherz and Hansen 1986). Although a minor rebound in overjet and sagittal molar relationship occurred during the second observation period, the dental arch relationship was normalized on a long-term basis in the Herbst sample.

Clinical examples

Two boys with a Class II:1 malocclusion (Cases 13-1 and 13-2) illustrating differences in growth pattern during the three examination periods are presented.

Case 13-1 (Fig. 13-2a,b)

A 12-year-old male was treated with the Herbst appliance for 7 months. The pre- and posttreatment examination periods were 2 years each. The boy originally had a small mandibular plane angle ($ML/NSL=26^\circ$), which was unchanged during the examination period of 4.6 years. Sagittal maxillary growth was restrained during Herbst treatment but recovered posttreatment. The mandible was positioned forward during treatment and dropped back posttreatment. The gonion angle was opened by 4° during therapy, but recovered completely thereafter.

Case 13-2 (Fig. 13-3a,b)

A 14-year-old male was treated with the Herbst appliance for 6 months. The pre- and posttreatment examination periods were 3 years each. The boy originally had an increased mandibular plane angle ($ML/NSL=37^\circ$), which was reduced during the examination period of 6.5 years. Sagittal maxillary growth was restrained during Herbst treatment but recovered posttreatment. The mandible was positioned forward during treatment and continued to grow forward posttreatment. The gonion angle was opened by 3° during therapy, but recovered completely thereafter.

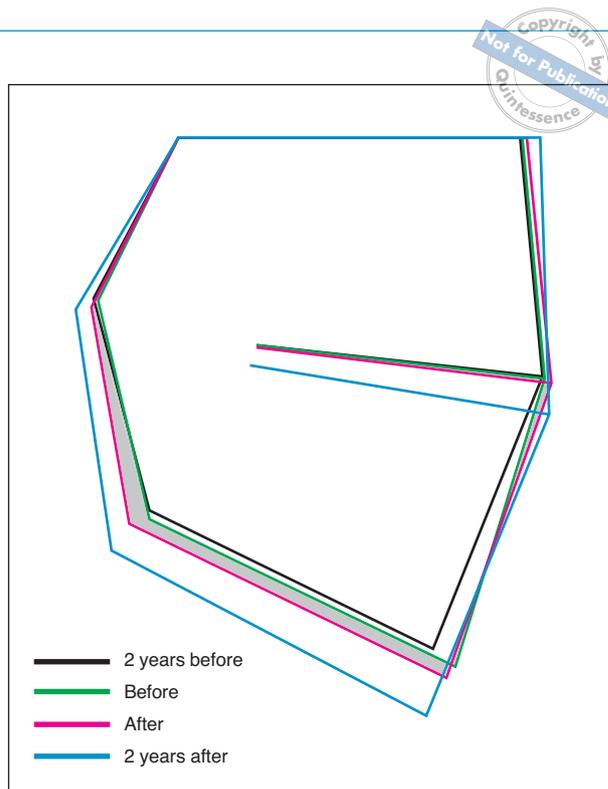


Fig. 13-2a Case 13-1 12-year-old male with a Class II:1 malocclusion treated with the Herbst appliance for 7 months. Superimposed facial polygons. (Revised from Pancherz and Fackel 1990)

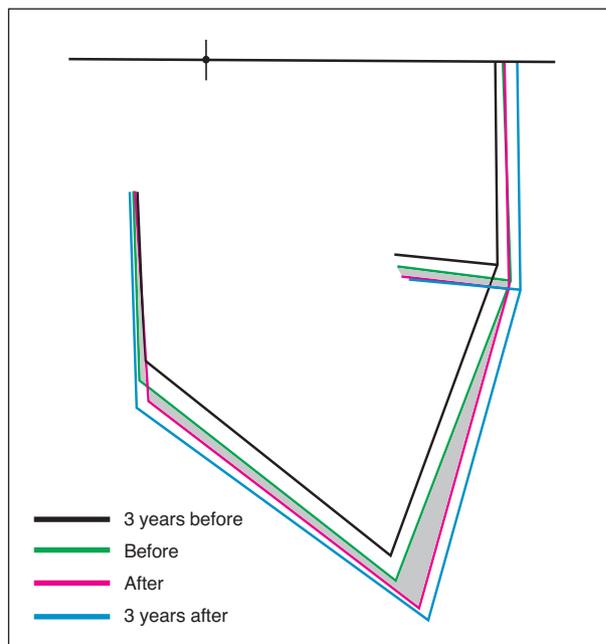


Fig. 13-3a Case 13-2 14-year-old male with a Class II:1 malocclusion treated with the Herbst appliance for 6 months. Superimposed facial polygons. (Revised from Pancherz and Fackel 1990)

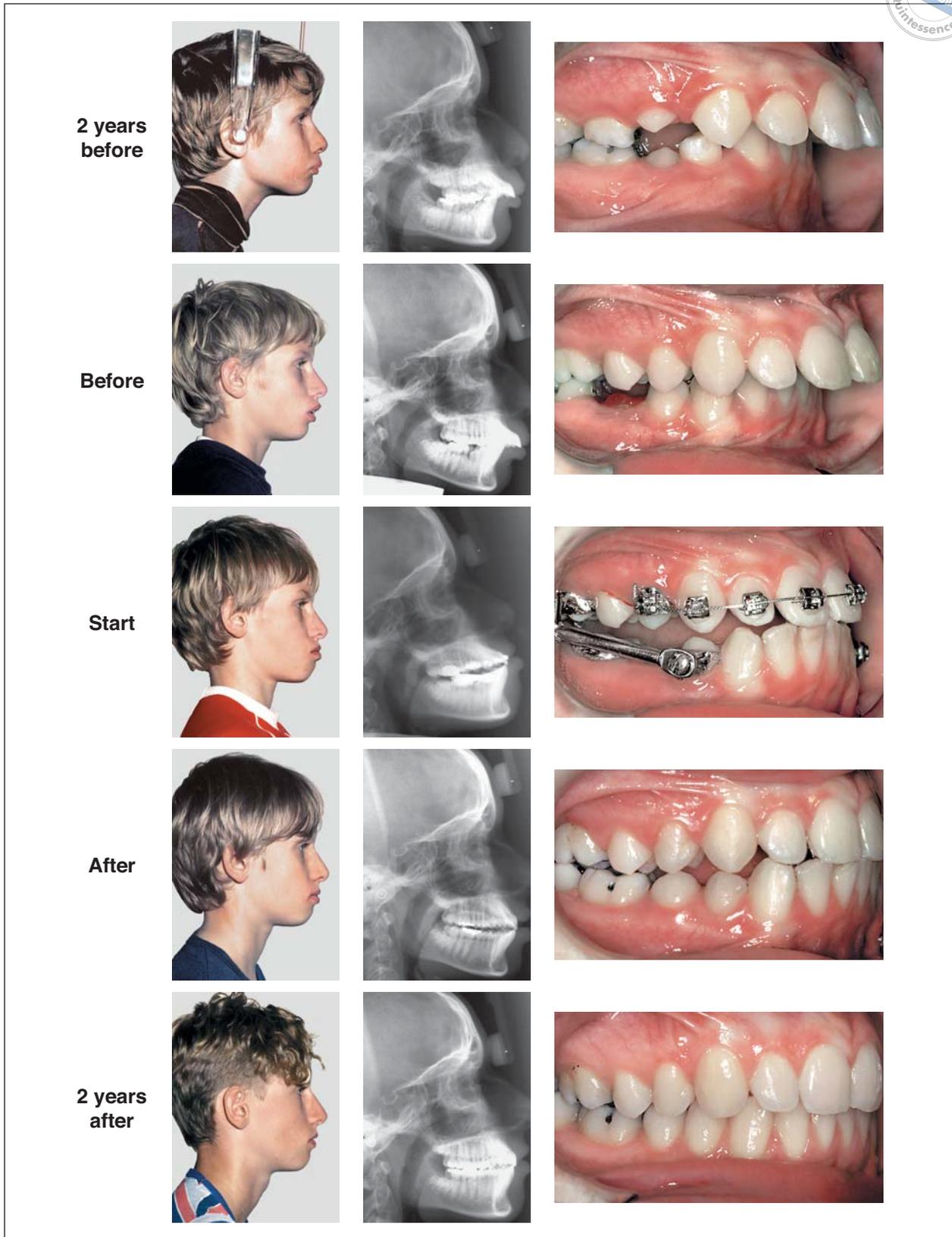


Fig. 13-2b Case 13-1 12-year-old male with a Class II:1 malocclusion treated with the Herbst appliance for 7 months. Profile photos, lateral head films and intraoral photos. (Revised from Pancherz and Fackel 1990)