Surgical Ablation of the Pituitary in the Treatment of Diabetic Retinopathy*

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Pituitary ablation has been found to arrest and reverse the course of progressive diabetic retinopathy in some patients. That improvement of vision can be maintained for several years has now been demonstrated by Pearson et al., 17 by Poul sen’s original case of postpartum hypopituitarism in a diabetic woman, 18 and by other reports. 7,8 It is still not clear how best to produce hypopituitarism in the severe diabetic with advancing retinopathy, or which patients to select for pituitary ablation.

Diabetic retinitis involves mainly small vessels and is unlike the disease commonly found in medium-sized arteries of the diabetic. At times, diabetic retinopathy of the proliferative type is self-limited and spontaneously enters a "healed" phase, during which the acute changes subside and scarring occurs. 2 This may take place without complete loss of vision or, in fact, with some preservation of useful vision in at least one eye. Thus, the decision to recommend pituitary ablation for any particular patient must rest largely upon the combined experience of the internist and ophthalmologist. Observations of large numbers of diabetic patients have at least improved the accuracy of predicting which patients may progress to inevitable blindness and should be considered for a pituitary procedure early enough in their course to preserve useful vision.

Earlier reports on total hypophysectomy by Luft et al., 17 Ray, 19 Kinsell 19 and Javid et al. 13 substantiated the initial improvement in some instances. They also emphasized the critical problems such as hypoglycemia, associated with surgical hypopituitarism at that time.

Pituitary Stalk Section

Field and his associates 6,9-11 have indicated in several reports that section of the hypophysial stalk alone has been adequate to arrest the advance of retinal disease in half of their patients and to retard it in many others. Their surgical technique involves placing a dome of gold foil over the sella presumably to prevent re-establishment of the hypothalamo-hypophysial portal system. Their hope was that a favorable therapeutic result could be achieved by stalk section that would avoid some of the dreaded complications of total hypophysectomy. The rapid onset of improvement in the eyes in some patients following pituitary stalk section has raised the question whether some factors of hypothalamic origin might have been eliminated or altered in addition to the obvious ischemic effect upon the anterior lobe. It is a tempting theory, since section of the hypophysial stalk is a relatively simple procedure.

However, many conflicting and inconsistent reports have appeared in the literature concerning the effect of pituitary stalk section. Connolly and Connell 4 reported on 3 glands studied following very low sections. One showed 75 per cent necrosis of the anterior lobe, the second 20 per cent, and in the third, no visible necrosis could be seen. McConnell, 15 in studying the arterial supply of the pituitary, described the "loral" arteries which brought a collateral flow of arterial blood into the anterior lobe. Russell 20 attempted to reconcile the divergent results, suggesting that very low section of the stalk, which included all of the superior hypophysial system, should produce extensive necrosis of the gland.

Xuereb et al. 21,22 in their classical study of
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Fig. 1. SHA, superior hypophysial artery. Paired vessels anastomose around stalk. Collateral supply through anterior lobe by way of "loral" arteries to trabecula. IHA, inferior hypophysial artery. Major blood supply to anterior lobe from portal systems.

The arterial and venous circulation of the pituitary, showed that there is, in fact, no direct arterial supply to the anterior lobe. The "loral" arteries (arteries to the trabecula) pass through the anterior lobe in their course toward the lower infundibular stem where, through a capillary network, blood then drains into the long and short hypophysial portal systems, and then distally into the sinusoids of the anterior lobe (Fig. 1). Daniel et al.5 and Adams, working with the same group,1 subsequently gave further evidence of the massive necrosis that can occur in the anterior lobe following low stalk section which transects the long portal system. Though there have been many arguments regarding the direction of blood flow in the portal systems, it seems quite conceivable that after obliteration of one end of these systems at the stalk, blood may at times assume an afferent or "backward" flow into part or all of the anterior lobe from surrounding venous sinuses.

Degree of hypopituitarism necessary. It is not yet known what degree of hypopituitarism is necessary to reverse the process in diabetic retinopathy permanently, nor does it seem possible at present to measure accurately the degree of hypometabolism which may follow a particular surgical or radiation procedure. A sudden, severe hypometabolic state will alter the insulin requirement of the diabetic patient clinically just as in Houssay's hypophysectomized, pancreatectomized animals. More important, it can rapidly effect cessation of retinal and preretinal hemorrhages, prevent further neovascularization, and at times even bring about vitreous clearing. The effectiveness of treatment may be enhanced by the hypometabolic state produced, and it is toward this end that surgical endeavors have thus far been directed. Our experience has been that simple division of the hypophysial stalk may at times compromise most of the blood supply to the anterior lobe and can be quite effective, but does not produce hypopituitarism consistently and cannot always be