TABLES

Table 1: Imaging

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
Kremer et al (2002)[2]	Study Design: Prospective followed case series. Patient Population: Fifty adult patients with NFPA Study Description: Patients underwent MRI before surgery, 3 days after surgery, then 3 months and at least 1 year after surgery on a 1.5T unit. Patients underwent ophthalmologic examination pre-op, immediately post op, and 3 months post-op. Patients underwent endocrinologic evaluation pre-op then 6 weeks post-op.	Clinical Assessment / III	Results: - Imaging 3 days post-op: All 32 patients with suprasellar extension of the mass preoperatively still demonstrated evidence of the presence of a suprasellar mass, but which was less homogenous. - At 3 months, hemorrhage had resolved with less mass effect by 50%, and a suprasellar mass was present in only 7 patients. - At 1 year, the suprasellar mass was present in only 4 patients. Visibility of fat graft was different and was completely absorbed at 1 year. Interpretation of images was difficult 3 days post-op, with suspected residual tumor in 25 patients. Interpretation of images was better at 3 months due to more homogenous enhancement and complete resolution of hemorrhages and post-op fluid collection, with residual tumor suspected in 15 patients. At 1 year, the rate and localization of residual adenoma tissue was unchanged as compared to the imaging 3 months post-op. Authors' Conclusions:

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			Early post-op (3 days) MRI imaging can be misleading on the amount of residual tumor. The best time for early imaging was at 3 months. Fat suppression technique applied on T1- and T2-weighted sequences also may be useful in post-surgical MR studies to distinguish hemorrhage, fat, and the posterior lobe of the pituitary gland. Comments: Not a randomized study. The results of the diagnostic tests were reached through consensus. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Colao et al (1998)[3]	Study Design: Retrospective case series. Patient Population: Eighty-four adult patients with NFPA. Study Description: Evaluate effects of surgery followed by RT in patients with NFPA. All 84 patients underwent surgical resection; 72 patients with residual tumor were considered for RT, but 13 refused.	Clinical Assessment / III	Results: Follow-up duration was 1 year for all 84 patients, 2-5 years in 63 patients, 6-10 years in 32 patients, and 16 patients were followed for more than 10 years. - 27 patients had recurrence/regrowth of the tumor. - Tumor regrowth was noticed in 9 patients postoperatively: in 5 (13.5%) after 2-5 years follow up, in 2 patients after 6-10 years follow-up, and 2 after >10 years follow-up. - Imaging after RT: 20 patients had radiologic cure, 17 had tumor size reduction, and 11 had no change.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Imaging, CT, or MRI was performed preoperatively, then 3, 6, and 12 months postoperatively, then yearly.		Authors' Conclusions: Long-term follow-up should be carried out in all patients with NFPA who had undergone surgery or surgery followed by RT. Comments: Long-term follow-up is recommended for all patients with NFPA. A different follow-up schedule may be adopted for patients who undergo surgical treatment versus surgery and RT. Concordance index between observers for the conclusions reached was not reported.
Chen et al (2011)[4]	Study Design: Prospectively followed case series Patient Population: 385 patients with NFPA Study Description: Patients operated on for NFPA were followed prospectively for a mean of 5.5 years. Visual, imaging, and endocrinologic outcomes were noted.	Clinical Assessment / III	Results: Post-op MRIs were done at 4 months, then yearly. Residual tumor was detected in 20.5% of patients at the 4-monht MRI. Progressive growth of residual tumor remnant occurred in 75% of cases. Authors' Conclusions: NFPA should be imaged 4 months after surgery to allow postoperative changes to resolve, then 1 year after surgery and yearly thereafter or with altered intervals depending on the clinical scenario.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
			Comments: The authors did not compare imaging versus endocrine versus ophthalmologic outcome to define best follow-up algorithm. The authors only observed the rate of recurrence based on their follow-up schedule. They did not compare 2 different types of follow-up schedules to define the better one. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Soto-Ares et al (2002)[5]	Study Design: Prospectively followed case series. Patient Population: Fifty-one patients with NFPA undergoing transsphenoidal surgery Study Description: Patients were followed prospectively after surgery with MRIs at regular intervals to define frequency of recurrence and/or regrowth; first post-operative MRI was performed 3-12 months after surgery, 6 months later and then, every 12-18 months for at least 2 years. The mean follow-up was 67 months.	Clinical Assessment / III	Results: Thirty-four patients found to have residual tumor on the first postoperative MRI. Thirteen patients had growth of this residual tumor, with a mean latency of 27 months. It was symptomatic in 4 of these patients. Seventeen patients with complete resections had no recurrences. Authors' Conclusions: MRIs should be performed at 4-6 months after surgery and at 12 and 24 months postoperatively. MRIs may be performed at 3, 5, and 10 years after surgery in cases of complete resection. In cases in which residual tumor exists, yearly MRIs are suggested.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
			Comments: The authors recommend 3, 5, and 10-year interval follow-up, but they did not perform a comparative study between different schedules to define a follow-up algorithm. We can only conclude that less frequent imaging follow-up is recommended in patients with complete resection and more frequent in patients with residual tumor. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Lillehei et al (1998)[6]	Study Design: Prospective trial Patient Population: Forty-five patients with NFPA, of whom 32 had complete resection and did not undergo post-surgical RT. Study Description: Patients were followed for a mean interval of 5.5 years with radiographic imaging obtained every 6 months for the first 2 years, then annually for postoperative years 3 and 4, and then every 2 to 3 years thereafter.	Clinical Assessment / III	Results: Two of 32 (6%) patients developed recurrence, at 18 and 24 months after initial surgery. Three additional patients died as a result of unrelated causes 9, 12, and 49 months after initial surgery Authors' Conclusions: There is a 6% 5-year recurrence rate in patients with NFPA treated using gross total surgical resection (GTR) alone. Comments:

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			The authors did not compare different follow-up algorithms. They describe that even patients who undergo GTR as defined by the postoperative imaging can recur, suggesting that long-term follow-up is needed even in patients who undergo GTR. The length of this follow-up is defined as at least 5 years by this study. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Greenman et al (2003)[7]	Study Design: Retrospective review of a prospectively followed patient cohort Patient Population: 122 patients undergoing surgery for NFPA Study Description: The clinical and radiographic courses of 122 patients undergoing surgery were followed for a mean of 51 months to identify predictors of recurrence and quiescence.	Clinical Assessment / III	Results: MRIs were performed 3, 6, and 12, months after transsphenoidal surgery, yearly thereafter for 5 years, and every 1-2 years afterwards or as clinically indicated. - Tumor enlargement occurred in 41 of 78 patients with residual tumor, with mean time for residual tumor enlargement = 27.3 ± 14 months - Tumor recurrence occurred in 6 of 30 patients with complete initial resections with a mean time = 61 ± 24 mo - 5-year RFS = 80% in cases of complete resection - 5-year RFS = 30% in patients with postoperative residual Authors' Conclusions:

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			Patients with complete resections are at low risk for recurrence over the follow-up period; those with residual disease, particularly in the cavernous sinus and suprasellar region, are at higher risk for tumor regrowth. Comments: No comparison of different follow-up schedules was performed. There is not a schedule difference on frequency of follow-up in patients with GTR or STR. From the data, long-term follow-up of patients with or without postoperative residual tumor is recommended. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as Class III study.
Reddy et al (2011)[8]	Study Design: Retrospective case series Patient Population: 144 patients with NFPA who underwent surgical resection alone. Study Description: The clinical and radiographic courses of 155 patients undergoing surgery for NFPA were reviewed. Patients were followed up for 1-25.8 years (yearly for first 5 years then every 2 years).	Clinical Assessment / III	Results: Overall regrowth was seen in 54 (34%) cases; 20.4% (11/54) recurred 10 or more years after surgery. Tumor recurred in 2/29 (6.9%) patients with no residual tumor post-op, in 27/67 (40.3%) of those with intrasellar remnant, and in 22/48 (45.8%) of those with extrasellar remnant. In patients with intrasellar residual, recurrence occurred in a range of 1.3-18.3 years. In patients with extrasellar residual, recurrence occurred in a range of 1-10.8 years postoperatively.

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	Postoperative images were classified as: (1) no residual; (2) intrasellar residual; (3) extrasellar residual; (4) unclassified. The latter 11 patients were removed from the analysis, leaving only 144 patients.		No recurrence was seen in the first 5 years in patients with no postoperative residual tumor. By 5 years, tumors recurred in 41.3% of patients in those with intrasellar residual and in 81.8% of patients in those with extrasellar residual. Authors' Conclusions: Postoperative surveillance of NFPA needs to be continued long-term. Patients with no residual tumors after first surgery may need a less frequent imaging surveillance. Comments: No follow-up schedules are compared. This is a retrospective study. Long-term follow-up is needed to evaluate for recurrence. According to the Assessment Classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Pal et al (2011)[9]	Study Design: Retrospective case series. Patient Population: Thirty-two adult patients with NFPA presenting after pituitary apoplexy and undergoing surgical resection.	Clinical Assessment / III	Results: No recurrence was noted in 5 patients who received RT post-surgery. Three of 14 patients with partial resection had a recurrence at 12, 51, and 86 months post-surgery as detected by MRI (no symptoms).

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Study Description: Follow-up with imaging (MRI or CT) was performed preoperatively, 3 months postoperatively, yearly for 5 years, then every 2 years. Five patients underwent RT 6 months after surgery due to large residual tumor. Mean follow-up lasted 83 months (range 20-150 months). For the other 27, follow-up was for a mean of 79 months (6-248 months). Thirteen received GTR and 14 had partial resection.		Recurrence rate was 4.3% and 13% at 2 and 5 years post-surgery. Authors' Conclusions: There is an 11% recurrence rate post-surgery at just over 5 years in patients who present with pituitary apoplexy. Follow-up imaging surveillance is recommended in patients who have partial resection. Comments: No follow-up schedules are compared. The only conclusion that can be deducted is that long-term follow-up is needed for patients who undergo surgical resection of NFPA. Concordance index between observers for the conclusions reached was not reported.
Van den Bergh et al (2007)[10]	Study Design: Retrospective case series. Patient Population: 122 patients undergoing surgery for NFPA.	Clinical Assessment / III	Results: Four percent of patients in group 1 progressed compared with 57% of group 2 patients. Local control rates were 95% and 22% in groups 1 and 2, respectively, at 10 years. For group 2, progression developed with a median interval of 30 months (11-95). Authors' Conclusions:

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Study Description: 76 patients with residual tumor had immediate postoperative RT (group 1); 28 patients with residual tumor were followed expectantly for growth (group 2); 18 patients had no residual tumor after surgery (group 3). Patients were assessed for progression and endocrine status and followed for a median of 7.8 years (group 1) and 5.9 years (group 2).		The wide intervals in which recurrences were detected (11-95 months) mandates continued radiographic surveillance. Comments: No comparison between the 3 groups as it pertains to the radiologic follow-up schedule intervals was performed. We can recommend that long-term follow-up for patients with residual disease after surgery is needed. Concordance index between observers for the conclusions reached was not reported.
Dekkers et al (2006)[11]	Study Design: Retrospective case series. Patient Population: 109 consecutive patients operated for NFPA Study Description: This cohort of NFPAs undergoing surgery was followed for a mean of 6.0 years to determine the efficacy of a treatment strategy for NFPA that did not routinely employ postoperative RT. MRIs were performed within 6 months of surgery, 1 year after surgery, and with increasing intervals thereafter.	Clinical Assessment / III	Results: Long-term PFS was achieved in 90% of all patients. In 1 patient, recurrence occurred after 12 years follow-up. In the 6 patients treated with postoperative radiotherapy, no tumor regrowth was observed. For the total cohort, the tumor growth-free survival rates 5 and 10 years after initial surgery were 94% and 81%, respectively. In patients with residual tumor on MRI, regrowth-free survival rates 5 and 10 years after initial surgical treatment were 92% and 74%, respectively. In patients without residual tumor, recurrence-free survival rates at 5 and 10 years were 100%.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
			Authors' Conclusions: Patients without residual tumor have a 100% recurrence-free survival; in those with residual tumor, recurrence occurs in 26%. Comments: The authors did not specifically study the follow-up in patients with NFPA. Nevertheless, their data supports long-term follow-up in patients undergoing surgery with or without RT. A different follow-up schedule may be adopted for patients with no residual versus those with residual tumor. Concordance index between observers for the conclusions reached was not reported.
Ferrante et al (2006)[12]	Study Design: Retrospective case series. Patient Population: 295 patients from 7 centers Study Description: Imaging data were reviewed in this large cohort of NFPA patients with a mean follow-up of 5.3 years after treatment. Treatment consisted of either surgery or surgery with RT for patients with residual tumor.	Clinical Assessment / III	Results: - Seventy-three patients did not show radiological evidence of residual tumor after surgical therapy (group A). Recurrence occurred in 19.2% of patients with a mean follow-up of 7.5 years. - Seventy-seven patients showed a postoperative tumor remnant but did not undergo radiation therapy (group B). Tumor regrowth occurred in 58.4% of patients with a mean of 5.3 years. - Seventy-six patients, with evidence of tumor remnant, were treated with RT after surgery (group C). Progression occurred in 18.4% of patients, with a mean of 8.1 years.

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			- Tumor regrowth of group B patients peaked after an interval of 5 years; recurrence of group A patients peaked after a 5-10 year interval; and tumor enlargement after radiotherapy in group C occurred equally across the follow-up period. Authors' Conclusions: These data suggest that a close follow-up, with serial MRI every year, is necessary for at least 10 years in all patients, even if GTR is achieved or postoperative RT for residual tumor is used. Comments: Long-term radiologic follow up is recommended in all patients, even if they undergo GTR or RT. The follow-up schedule may be different for patients with GTR versus those with residual tumor. Concordance index between observers for the conclusions reached was not reported.
Kopp et al (2012)[13]	Study Design: Retrospectively screened and prospectively followed series of patients. Patient Population: Sixteen adult patients with NFPA.	Clinical Assessment / III	Results: There was an inverse correlation between time from FSRT and relative tumor size reduction. Earliest size reduction was noticed at 28 months post-FSRT. Size reduction was by 26% (<36 months), 47% (36-72 months), and 62% (>72 months).

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Study Description: Patients had undergone at least 1 surgical intervention for NFPA. Eight with recurrent tumor and 8 with residual tumor underwent FSRT with mean radiation dose of 49.4 Gy. Mean follow-up was 63 months (28-100 months). Follow-up with 3D 1.5T MRI was every 6 months for 2 years and yearly afterwards.		No progression of disease was seen. A size reduction was noticed in only 31% of patients when measurements were made on 2D images, as compared to 100% in volumetric measurements. Authors' Conclusions: The earliest reduction in size after FSRT was noticed at 28 months. Volumetric measurement is more accurate than measurements in 2D. Comments: This study has a small number of patients. The authors followed patients for tumor shrinkage. A less frequent radiologic follow-up may be adopted for patients undergoing FSRT. Concordance index between observers for the conclusions reached was not reported.
Iwata et al (2011)[14]	Study Design: Retrospective case series. Patient Population: One hundred patients with NFPA (primary, recurrent, or remnant).	Clinical Assessment / III	Results: Local control rate at 3 years was 98%. In-field failures in 3 patients occurred at 10, 16, and 80 months. Authors' Conclusions:

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Study Description: Patients treated with Cyberknife in 3-5 fractions had MRI, visual, and endocrinologic assessments at 1, 3, 6, 12, and every 6 or 12 months thereafter to assess control and toxicity; median follow-up was 33 months.		Distant in-field failures after RT in 3% of patients mandate continued surveillance MRIs. Comments: Although this article did not specifically study follow-up need for NFPA patients treated with RT after surgical resection, it suggests that long-term follow up is necessary even after RT due to risk of tumor recurrence.
Coulter et al (2009)[15]	Study Design: Retrospective case series. Patient Population: Forty-one adult patients with NFPA. Study Description: Thirty-three patients underwent surgical intervention (80.4% of patients), and 8 were observed. Thirty of 33 patients received post-op RT. Median time of first post-op scan was 9 months. Subsequent scans were annual or biannual. Patients were not scanned anymore after tumor was stable in 3 subsequent imaging studies – defined as "state of no change".	Clinical Assessment / III	Results: Five patients showed evidence of tumor growth, 1 in the non-surgery group and 4 in the surgery group. One patient showed evidence of growth at 9 months and visual deficits at 7 years. "State of no change" was reached the earliest at 6 months and the latest at 120 months. Tumor growth was noted the earliest at 4 months and the latest at 27 months. 50% of tumors reached the "no-change status" at 30 months and 90% reached the status at 88 months. Authors' Conclusions:

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			Radiological follow-up beyond 3-3.5 years is not recommended. Routine radiologic follow-up could be discontinued after the tumor has attained a steady state, and clinical follow-up with regular ophthalmologic examination and endocrine assessment should be continued thereafter. Comments: The authors did not conduct a cost analysis to define whether radiologic follow up is more cost-efficient than ophthalmologic and endocrinologic follow up. The authors did not study the rate of recurrence and/or growth of the tumor after 3 subsequent scans showed stable residual tumor. The time interval between the 3 stable scans varies from 6 to 120 months, and the time frame between these 3 scans to define the "state of no change" has not been defined. Concordance index between observers for the conclusions reached was not reported.
Kremer et al (1996)[16]	Study Design: Prospectively followed case series of patients. Patient Population: Twenty-two adult patients with NFPA.	Clinical Assessment / III	Results: At 3 months follow-up, 11 patients (50%) were noticed to have residual tumor, and in 4 (18%), findings were equivocal for scar vs residual. Biannual evaluation for 2 years did not demonstrate any changes in residual tumor volume. Authors' Conclusions:

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
	Study Description: Patients underwent MRI (1T) evaluation immediately pre-op and 3 months post-op. Patients with suspected residual tumor underwent MRI evaluation every 6 months for the following 2 years.		Post-op MRI at 3 months is helpful to assess the completeness of tumor resection. Comments: Patients were followed prospectively, but no comparison to other follow-up schedules was made. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Rajaraman, Schulder (1999)[17]	Study Design: Prospectively followed case series. Patient Population: Fourteen patients with pituitary adenoma (11 NFPA, 2 prolactinoma, 1 necrosis) Study Description: To study MRI appearance of sella following pituitary adenoma resection. Patients underwent early MRI within 1 week postoperatively and late MRI at 3 months and up to 1 year postoperatively.	Clinical Assessment / III	Results: Early postoperative MRI scans revealed minimal reduction in mass effect; in fact, the mass appeared larger in 2 patients. The post-op mass appeared less homogenous and lacked uniform enhancement. Late post-op MRI showed significant reduction in size of the mass in all patients. Author's Conclusions: In view of the persistence of post-surgical changes for up to 4 months after surgery, optimal assessment of residual tumor cannot be made until after that time. Additional treatment for stable patients should be delayed for at least 4 months after resection of pituitary adenoma.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
			Comments: Not randomized study. According to the Clinical Assessment classification criteria, this study did not report the concordance index between the observers for the conclusions reached. Hence, it was classified as a Class III study.
Berkmann et al (2013)[18]	Study Design: Retrospective case series. Patient Population: One hundred and forty patients with NPFA who were found to have residual tumor residual postoperatively. Study Description: Patients who underwent surgical resection of NFPA performed in an intraoperative MRI with residual tumor. They were followed for a mean duration of 2.7 years to assess the growth patterns of tumor remnants, with predictors of remnant shrinkage sought.	Clinical Assessment / III	Results: At the 3-month follow-up MRI, reduction in the size of tumor remnant was seen in 70 (50%) patients. Among patients not treated with further surgery or radiotherapy, no significant volume changes occurred between the 3 months and the 1 year postoperative follow-up visits. 19% of patients with reduction in the size of residual tumor underwent further treatment. In 43 (31%) patients, tumor residuals depicted by intraoperative MR images were not depicted on postoperative MR images 3 months later. Authors' Conclusions: In some patients with NFPA undergoing transsphenoidal surgery, residual mass lesions can shrink significantly in 3 months; little change appeared to occur between 3 months and 1 year.

Author (Year)	Description of Study	Classification Process / Evidence Class	Results and Conclusions
			Comments: Immediate postoperative MRI may be deceiving in assessing residual tumor even when performed intraoperatively. Concordance index between observers for the conclusions reached was not reported.